CAPE TOWN RESIDENTIAL PATTERNS

**An Examination Of Natural Processes In Housing,
And Of The Distortion Of These Natural Patterns,
All With Special Reference To Cape Town.**

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YEAR	MUNICIPALITY OF CAPE TOWN POPULATION PER SQUARE MILE
1946	2318
1951	2179
1960	2254

B.

- Bureau of Statistics.

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SCOPE AND APPROACH.

The study which follows is concerned with the housing of people within cities, and special reference is made to Metropolitan Cape Town in this context.

The object of the study was to isolate certain principles relating to housing, formulating these in such a way that they might, in being tested, yield results useful to City Planners. (*1) Having established such principles, a further purpose of the study was to contrast these against other factors influencing housing such as Town Planning and Legislative Controls, and the effect the latter had upon the former.

The principles which were the initial concern of the study originated in the Life Sciences (*2) and the Human Sciences (*3). Although the author cannot claim authority in any of these Sciences, the principles borrowed from them are well known, and served the valuable purpose of permitting a field theory to be constructed.

Hypotheses, developed from this field theory, were tested and in so doing yielded some surprising and gratifying results. These results may be found on the pages following, and it will be seen that they appear to justify the method of approach.

DEVELOPMENT OF THE FIELD THEORY.

THE HOUSING PROBLEM.

The basic problem which an individual faces in choosing suitable housing may be stated as follows :-

> In being attracted to a common meeting space unlimited individuals wish their housing to be located conveniently to it but simultaneously to be distinctly seperated both from it and from other housing. (*4)

There ... / 2.

There is thus in the location and demarcation of housing a dilemma which must be resolved. The pattern of its resolution may be seen marked upon the landscape (*5), and it is possible to measure this and draw conclusions about the relative strength of the two conflicting forces which brought it about.

THE ECOLOGICAL BASIS OF HOUSING.

In order to break down what is understood by "housing" into related components which are suitable for measurement, a concept derived from Ecology (*6) may be used.

Ecology is the Science of the study of an individual in relation to his environment, (*7) and since we are concerned with the relationship of an individual to that part of his environment called "housing", we may conveniently use the tenets of this Science for our purpose.(*8)

In the following explanation of the concept, four principles terms are used, which in themselves summarise the concept. Three of the terms are in common use, but specific meanings have been put to them here, while the term "egospace" was coined to fulfil a need which will become apparent.

These four terms may conveniently be listed and defined at the outset as follows :-

ENVIRONMENT.

The total space, including all the animate and inanimate objects within it, within which a single living organism conducts its life. (*9)

EGOSPACE.

That portion of the environment which is private to an individual, within which he finds security for himself and his possessions, and within which he habitually rests and carries out his most private activities. (*10)

TERRITORY.../ 3.

TERRITORY.

That portion of the environment which includes the egospaces of one or more individuals, and which is defended by this individual or individuals against intrusion by other members of the same species. (*11)

HOUSEHOLD.

The total group of individuals who occupy and defend any single territory.(*12)

Using these definitions, and from the background of the philosophy summarised in the appendix, (*13) we may now, in explaining the concept, bring out some of the features of it which will help us to formulate testable hypothoses.

Consider the proposition :- 'Environment is defined as the "air, water and food; the winds and the topography of the land; and general living habits";(*14) and the animals and plants which surround an individual, and which affect his wellbeing and his way of life'.(*15)

By the definition, a married man is part of the environment of his wife, as she is of his and as their house and their neighbours are part of each of their environments. Although the man and his wife occupy the same household they do not occupy the same environment. This is partly because there are elements which they do not share such as the wifes bridge club which is not part of the husband's life any more than the husband's golf club belongs to that of the wife. It is also because the wife's environment has a husband in it, which therefore differs from the husband's environment which has a wife in it. Therefore, according to the definition, there are as many environments as there are individuals.

It is important to stress this apparently obscure ecological point, because there is a popular tendency to regard environment as being something to which people collectively are related, although that meaning is specifically excluded by our definition.

Having ... / 4.

Having established what we mean by environment, let us consider "egospace", or that part of the environment which serves certain functions of a private and personal nature, such as satisfaction of the territorial instinct, the provision of security while sleeping, of privacy and of secure storage of personal effects, and so on.

Although this definition appears vague from some points of view, it will serve here, for it can be seen that we see an egospace as part of the environment of an individual. Thus a house occupied by a man, his wife and three children is a household of five egospaces.

Biologists have generally recognized that creatures adapt their physical structure to suit the environment, (*16) ever since Darwin demonstrated the mechanism of this process.(*17) Ethologists similarly recognise that behaviour adjusts to an environment (*18) in the same way and psychologists and social anthropologists have adapted this dictum into their theories and researches. (*19) Students of Public Health have held that the suitability of environment affects the health and welfare of individuals (*20), a notion which has its origins in the ancient Greek school of Physicians. Ecologists, drawing from Darwin, hold that individuals adapt to their environments in response to the stimuli of that environment, thus vindicating the long discredited Lamarckian thesis to that effect.(*21) But the ecologists go further, and argue that the environment adapts in response to stimuli emanating from the individual. The effect of man upon the landscape can readily be seen, of course, but this is true also in another sense, for the environment of an individual includes other organisms who themselves are adapting to the stimuli of their environment which includes this individual. (*22) So in this sense, individuals and their environments adapt to each other, and it is inherent in this process that they should adapt toward a symbiotic relationship.

We can thus summarise all the above by stating that the form and character of the households and the form and character of the territories are both determined at the point at which the forces which each exert upon the other come into equilibrium. (*23)

We ... / 5.

We have earlier put forward a view of the location of territory being subjected to contrary forces, and we may thus say that the location and extent of territory is determined by the point at which the centripetal and centrifugal forces acting upon it come into equilibrium.

If we were to look at the extent of territory alone, we can say that this is determined by the outcome of an interaction between the territory and its household (*24) at the same time that the territory interacts with the central place and other centrally oriented territory.

HOUSEHOLD (***) TERRITORY (***) CENTRAL PLACE, ETC.

Consider now the relative emphasis of these three variables as the distance to the central place decreases.(*25) One would expect that greater interaction will take place between territory and territory, forcing smaller size upon these territories, and in this respect reducing the capability of the territories to adapt to the Households occupying them, and placing a greater onus on the Households to adapt to their territories.

It can consequently be postulated that :-

> "Inasmuch as the extent or size of the territory is inversely proportional to its distance from the Central Place, its capability for adaptation as a suitable environment is directly proportional to its distance from the Central Place."(*26)

From which one may deduce that :-

> "The degree of adaptation demanded of a household increases as the size of its territory is decreased by forces external to the territory."

AS ... /6.

As can be seen, the variable "territorial size" in the above proposition is readily measurable.

In order to reduce the other variable in this proposition to measurable terms, let us consider the nature of Households.

It will be recalled that we defined "Household" as being the nett result of one or more egospaces occupying a territory. Now the people of a Household may be associated in their joint occupation by blood relationship, marriage, friendship, press of circumstance, pure chance or any other reason whatsoever, and the numbers within any territory may vary extensively. (*27)

From the definitions of Egospace and Territory one can deduce that an Egospace is of finite extent, since a territory of finite extent can be occupied by a household of only one Egospace. (*28)

Consider a household of one Egospace upon a territory of size equivalent to the size of the Egospace. If another egospace be added to the household, then either the size of the territory will alter or it will not, depending upon whether two egospaces in combination have different territorial desires in terms of size than does a single egospace. (*29)

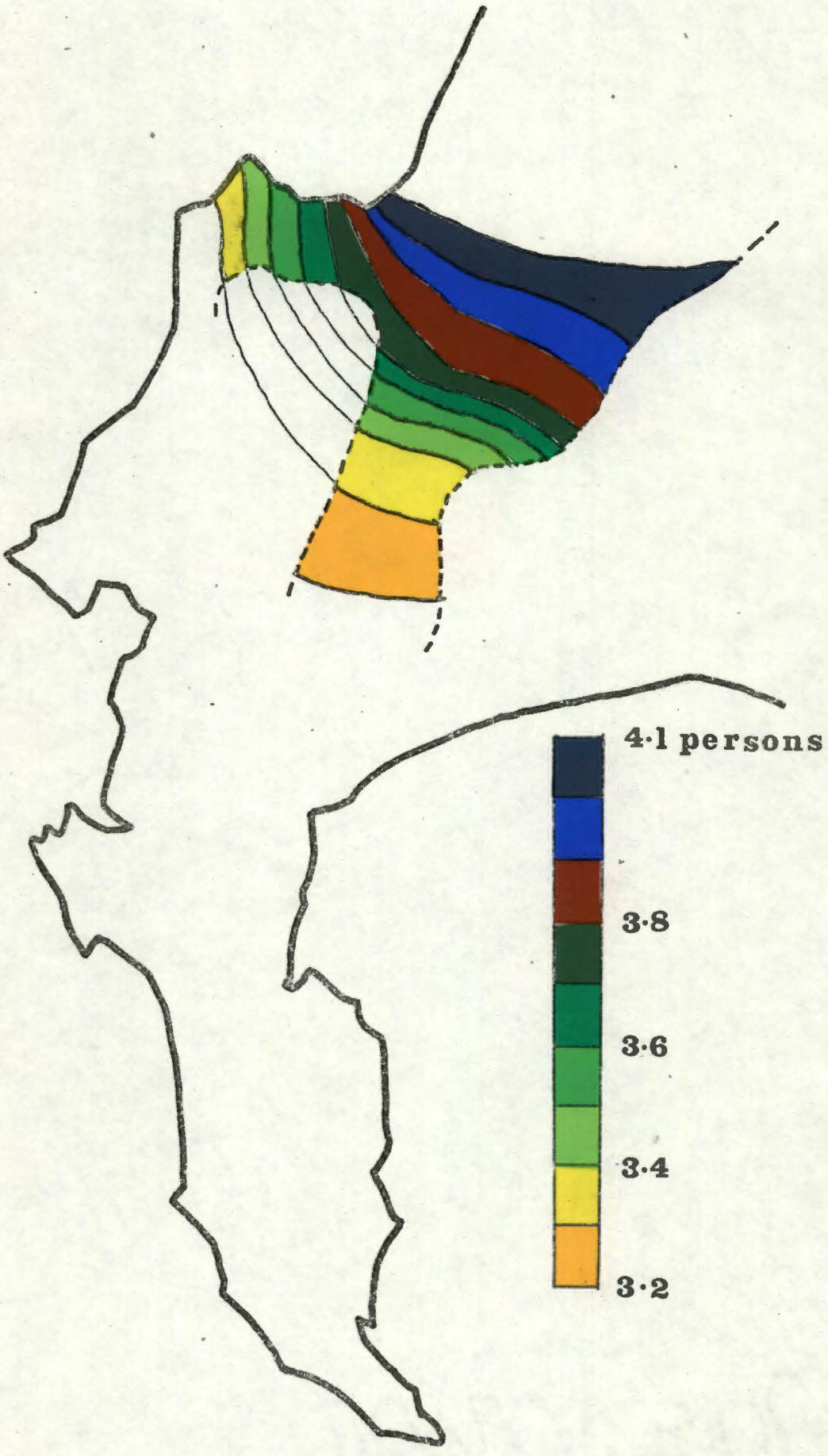
Of course, different combinations of pairs of egospaces may lead to different desired sizes of territory, but for the purposes of this study it was presumed that these variations would follow a normal chance distribution, and that consequently there would be constant variation about a mean.

It can now be stated that either the size of a Territory tends to vary as Household size varies, or it does not. One may go further and state that either :-

Territorial ... / 7.

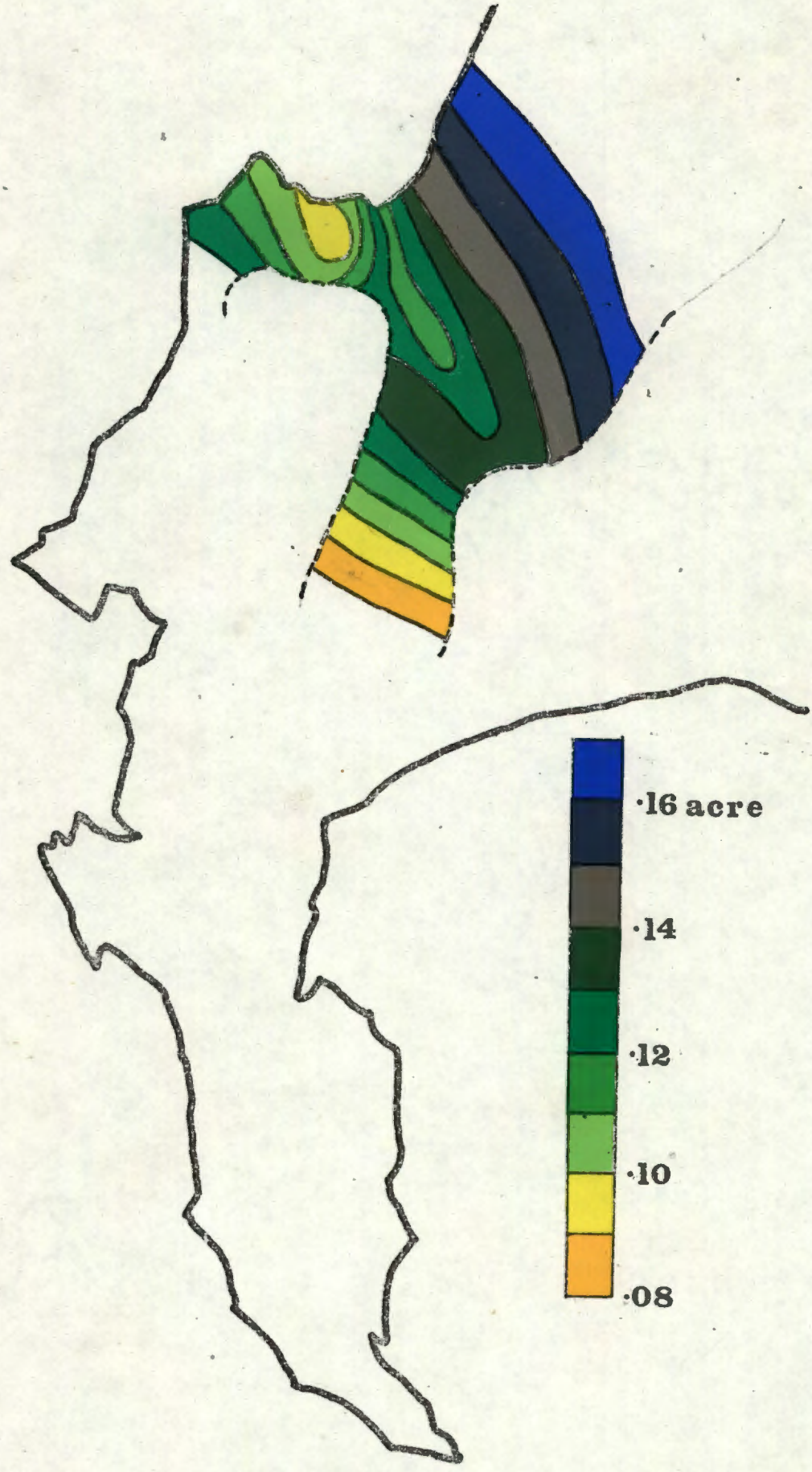
METROPOLITAN CAPE TOWN

MEAN HOUSEHOLD SIZE



METROPOLITAN CAPE TOWN

MEAN TERRITORIAL SIZE



Territorial size varies in direct proportion to Household size (*30)

or

Territorial size varies as Household size varies, but not in any fixed proportion

or

Territorial size and Household size vary independantly of each other.

Since both Household size and Territorial size are variables which can readily be measured, it is possible to test the above hypotheses against the situation prevailing in Cape Town.

TESTING THE HYPOTHESIS :-

" HOUSEHOLD SIZE AND TERRITORIAL SIZE VARY IN A CONSTANT PROPORTION TO EACH OTHER".

The data used in testing the hyposthesis originated in a survey conducted by Market Research Africa (Pty) Ltd., during the course of 1968. (*31) The sample was of 1012 Households, and was seperated into twenty three areas which together covered greater Cape Town.

Two groups of data from this source were used in the following tests. The first group was classified by type of dwelling unit (Flat, Hotel, House, etc.) and in the case of houses by size of land subdivision (0 - $\frac{1}{8}$ acre, $\frac{1}{8}$ - 1/4 acre etc.) In the second group of data the Household's were classified by their size (Households of two persons etc.) (*32)

As a first step, the hypothesis was roughly tested in the following fashion :-

The data was consolidated into seven zones, as the sample size in many of the twenty three areas was too small to be a reasonable reflection of the populations. (*33) Mean Household sizes and Territorial sizes were then computed for each

zone, ... / 8.

zone, (*34) and were expressed on the map of Cape Town as contours. Diagrams D1 and D2 illustrate the results.

If the two sets of contours were approximately congruent, then it would be a point in favour of the hypothesis.

As will be observed from Diagrams D1 and D2, the contours for Household size and territorial size resemble each other in general conformation, and it can be seen that both increase along an axis from South-West to North-East.

This result is contradictory to the earlier postulation that territorial size will tend to decrease as the Central Place is approached, unless the Central Place lies in the Constantia Valley, which it clearly does not do. (*35)

However, the postulation is not disproved as the method of analysis used does not take into account variation about the mean.

For the same reason, the hypothesis that Household size and Territorial size vary in constant proportion, is not proved by the analysis.

THE CHI-SQUARE TESTS.

In order to establish whether similarities between the Household size Distribution data and the Territorial Size Distribution data had a high or low probability of having occurred by chance, and whether the observed variations between them had a high or low probability of having occurred by chance, use was made of the approximate Chi-Square by Degrees of Freedom Test for Homogeneity. (*36)

TEST TI.

In this test, nineteen of the twenty three data areas were grouped into eight zones, the areas 4, 9, 10 and 21 not being useable. (*37) Mean Household

size ... / 9.

size and Territorial size were computed for each of the eight zones, and eight contingency tables were arranged by four criteria. (Household / Territory by larger than Mean / Smaller than mean).

The hypothesis tested was that the two groups of data were homogenious, against the null hypothesis that they were not.

It was arbitrarily decided that if there was a probability of greater than 0.95 to 1 that the four categories would not have occurred in their respective frequencies due to chance, that is to say that if the calculated value of Chi-Square exceeded 3.84, then the Hypothesis would be rejected in favour of the Null Hypothesis.

ZONES		Hhold	Territ.	Total	Calc. Value Chi. Square	HYPOTHESIS OF HOMOGENEITY
	LARGE	35	41	76		
1 - 3	SMALL	69	62	131	0.603	ACCEPT
	TOTAL	104	103	207		
	LARGE	18	18	36		ACCEPT
5 - 6	SMALL	35	35	60	0.000(*38)	
	TOTAL	53	53	106		
	LARGE	42	37	79		
7,8,11	SMALL	36	41	77	0.330	ACCEPT
	TOTAL	78	78	156		
	LARGE	28	30	58		
12	SMALL	37	35	72	0.028	ACCEPT
	TOTAL	65	65	130		
	LARGE	54	56	110		
13 - 14	SMALL	44	42	86	0.018	ACCEPT
	TOTAL	98	98	196		
	LARGE	33	32	65		
15 - 16	SMALL	60	61	121	0.022	ACCEPT
	TOTAL	93	93	186		

LARGE ... / 10.

ZONES		Hhold	Territ.	Total	Calc.Value	HYPOTHESIS OF
	LARGE	70	69	139	Chi.Square	HOMOGENEITY
17 - 20	SMALL	65	66	131	0.012	ACCEPT
	TOTAL	135	135	270		
	LARGE	102	118	220		
22 - 23	SMALL	62	46	108	3.104	ACCEPT
	TOTAL	164	164	328		

We are thus able to conclude that in the 19 areas tested, there tend to be as many Households greater than the mean metropolitan size as there are Territories greater than the mean metropolitan size, and also as many of both categories smaller than the respective metropolitan means.

TEST T2.

In order to arrive at a more specific relationship, various combinations of the two classes of data were tested against each other. It was found that when the Household size was grouped as small (0 - 2 persons), medium (2 - 4 persons) and large (5 and more persons), and the territorial size data was grouped as small (Flat, hotel, etc.) Medium (Houses up to 1/4 acre) and large (Houses in excess of 1/4 acre), most significant results were achieved when the Chi-Square test was applied.

In this test, areas 4, 19, 21 and 23 (*39) were not used and the remaining 19 areas were grouped into 8 zones. The contingency table shows Households and Territories by small, medium, and large size.

The hypothesis tested was "that in each zone of Metropolitan Cape Town, there are as many flats, etc., as there are Households of 2 persons or less, as many Houses on less than 1/4 acre as there are Households of 3 and 4 persons, and as many Houses on more than 1/4 acres, as there are Households of more than four persons."

It ... / 11.

It was arbitrarily decided that if the observed difference in the frequencies of the occurrances were such as would not have happened by chance if the sample had been drawn ten times (i.e. if the calculated value of Chi-Square, having two degrees of freedom, exceeded the expected 0.90 value of Chi-Square which is 4.61) Then the hypothesis could not be accepted with confidence.

ZONES		Hhold	Territ.	Total	CALC. VALUE CHI-SQUARE	HYPOTHESIS OF HOMOGENEITY
	LARGE	14	20	34		
	MEDIUM	53	44	97	1.892	ACCEPT
1 - 3	SMALL	37	40	77		
	TOTAL	104	104	208		
	LARGE	10	8	18		
	MEDIUM	17	12	29	1.133	ACCEPT
5 + 6	SMALL	27	33	60		
	TOTAL	54	53	107		
	LARGE	34	31	65		
	MEDIUM	59	59	118	2.304	ACCEPT
7 - 10	SMALL	19	32	51		
	TOTAL	112	122	234		
	LARGE	22	11	33		
11 - 12	MEDIUM	47	59	106	4.170	ACCEPT
	SMALL	32	31	63		
	TOTAL	101	101	202		
	LARGE	29	28	57		
13 - 14	MEDIUM	47	47	94	0.000	ACCEPT
	SMALL	22	23	45		
	TOTAL	98	98	196		
	LARGE	16	14	30		
	MEDIUM	33	35	68	0.046	ACCEPT
15 - 16	SMALL	44	44	88		
	TOTAL	93	93	186		
	LARGE	26	25	51		
	MEDIUM	40	40	80		ACCEPT
17,18,20	SMALL	15	16	31	0.000	
	TOTAL	81	81	162		

ZONES ... / 12.

ZONES		Hhold.	Territ.	Total	CALC.VALUE CHI-SQUARE	HYPOTHESIS OF HOMOGENEITY
	LARGE	24	26	50		
	MEDIUM	31	29	60		
22	SMALL	7	7	14	0.036	ACCEPT
	TOTAL	62	62	124		

In view of the results of the above test, it is hard to escape the conclusion that in all the zones tested, there tends to be the same number of Households and territories in each of the following groupings :-

Flats and Households of 2 persons or less.
Houses on less than 1/4 acre and Households of 3 and 4 persons.
Houses on more than 1/4 acre and Households of more than 4 persons.

TERRITORIAL SIZE IS NOT A FUNCTION OF INCOME.

What then of the widely held belief that Territorial size is a function of Household Income ? It would be too much to expect that this would be so in view of the above finding, but nonetheless two tests are quoted here to demonstrate that it is indeed not so.

In these, two tests, T3 and T4, the criteria are the same except that Mean Household Income in T3 and Modal Household Income in T4 are used in place of mean family size. (* 40) The zone groupings are these of T2 and the critical level of Chi-Square is again 3.84.

TEST T3.

Households Incomes and Territorial sizes greater or less than the Metropolitan Mean.

ZONES ... / 13.

ZONES		Income	Territ.	Total	CALC.VALUE CHI-SQUARE	HYPOTHESIS OF HOMOGE-NEITY
1 - 3	SMALL	40	62	102	8.482	REJECT
	LARGE	64	42	106		
	TOTAL	104	104	208		
5 - 6	SMALL	20	355	55		
	LARGE	33	18	51	7.404	REJECT
	TOTAL	53	53	106		
7 - 10	SMALL	59	48	107		
	LARGE	52	74	126	3.895	REJECT
	TOTAL	111	122	233		
11 - 12	SMALL	50	61	111		
	LARGE	51	40	91	1.998	ACCEPT
	TOTAL	101	101	202		
13 - 14	SMALL	51	42	93		
	LARGE	47	56	103	1.308	ACCEPT
	TOTAL	98	98	196		
15 - 16	SMALL	42	61	103		
	LARGE	51	32	83	7.046	REJECT
	TOTAL	93	93	186		
17,18,20	SMALL	43	29	72		
	LARGE	38	52	90	4.222	REJECT
	TOTAL					
22	SMALL	40	13	53		
	LARGE	22	49	71	11.137	REJECT
	TOTAL	62	62	124		

There is no evidence here to support the belief that the same standards of territorial size vis-a-vis income operate throughout the Metropolitan Area.

TEST ... / 14.

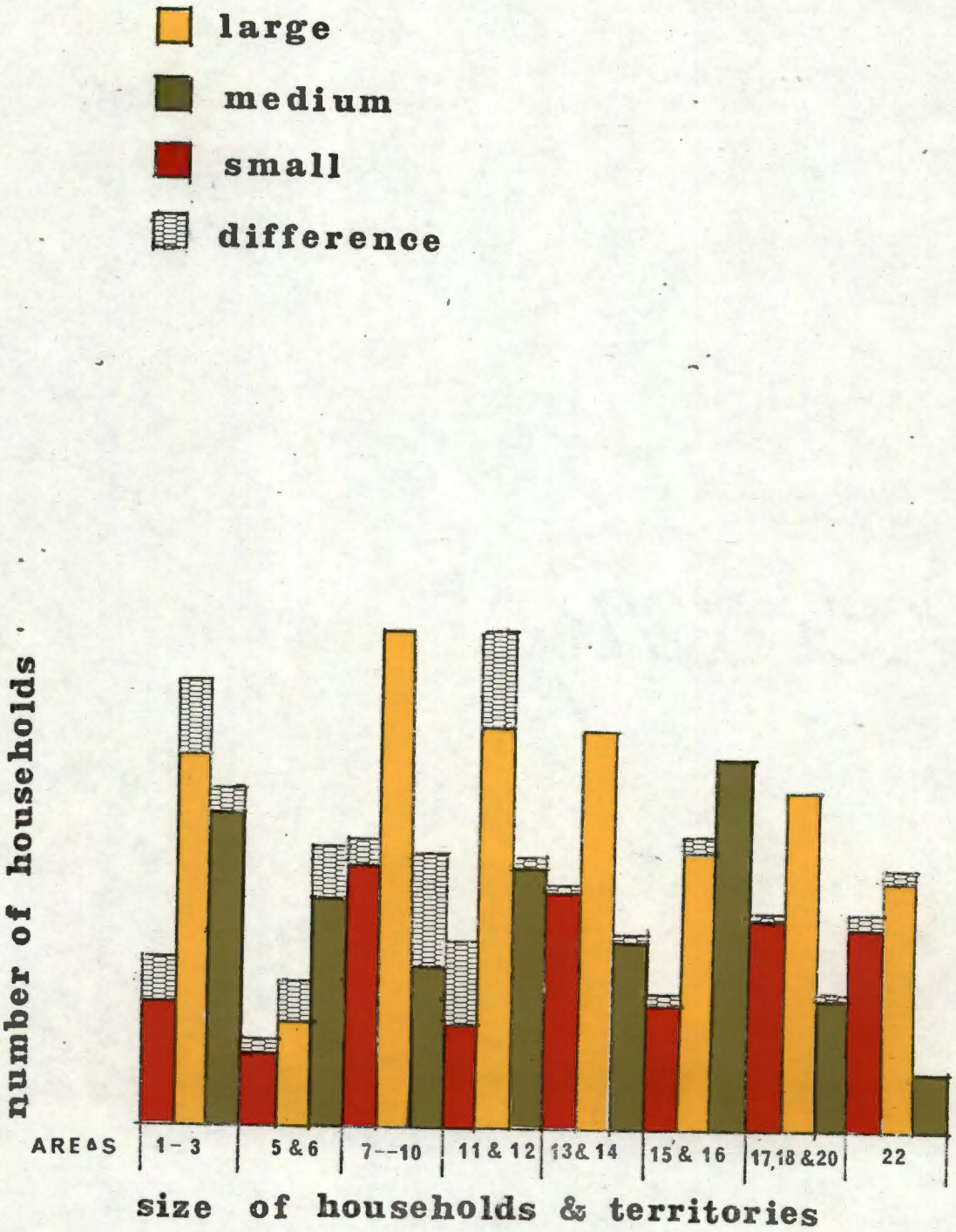
TEST T4.

As T3 but using the Modal Income instead of the Mean Income.

ZONES		Income	Territ.	Total	CALC.VALUE CHI-SQUARE	HYPOTHESIS OF HOMOGENEITY
1 - 3	SMALL	29	62	91	19.312	REJECT
	LARGE	75	42	117		
	TOTAL	104	104	208		
5 - 6	SMALL	13	35	48	8.394	REJECT
	LARGE	40	18	58		
	TOTAL	53	53	106		
7 - 10	SMALL	48	48	93	0.000	ACCEPT
	LARGE	66	74	140		
	TOTAL	111	122	233		
11 - 12	SMALL	36	61	97	11.42	REJECT
	LARGE	65	40	105		
	TOTAL	101	101	202		
13 - 14	SMALL	33	42	75	1.380	ACCEPT
	LARGE	65	56	121		
	TOTAL	98	98	196		
15 - 16	SMALL	28	61	89	11.030	REJECT
	LARGE	65	32	97		
	TOTAL	93	93	186		
17,18,20	SMALL	29	29	58	0.000	ACCEPT
	LARGE	52	52	104		
	TOTAL	81	81	162		
22	SMALL	25	13	38	4.590	REJECT
	LARGE	37	49	86		
	TOTAL	62	62	124		

The conclusion is the same as for Test T3.

THE ... / 15.



VARIATION IN NUMBERS OF HOUSEHOLDS AND TERRITORIES BY SIZE

THE PATTERN OF HOUSING DEMAND.

We are now much better able to understand the Cape Town Housing Pattern. It is clear that Household sizes are in close adjustment to subdivision sizes, and it can also be shown that the four principal income groups are evenly distributed throughout the Metropolitan Area although segrated into different areas within each zone, (* 41). That Mean income varies from zone to zone can also be demonstrated, (* 42), notwithstanding the homogeneity of the zones from the point of view of Range in Income by Group.

The conclusion must be that there is no income group which particularly favours (or is relegated to) any particular zone, but that there is minor price competition within each Income Group for housing in more favoured zones, while there is definite competition between different income groups within each zone for the most desireable areas within that zone.

THE ECONOMISTS VIEW.

We have now moved from considering Housing in an Ecological way, to considering it from an Economist's viewpoint. Housing is a scarce resource for which there is unlimited demand, and if the values of our Western Politico-Economic system are to be satisfied, it will be allocated by means of the Price Mechanism.

There is no essential reason why the theories of Price Competition should be incompatible with the Ecological framework from which we started, for in both theories the onus is placed upon the individual to exercise choice, and in both systems the theoretical end product is the allocation of resources to those best equipped to command and use them.

In the next section we will consider a theory of Housing allocation by the Free Market System, and from this and further measurement we will be able to draw further conclusions about the structure of Housing in Cape Town.

THE ... / 16.

THE ECONOMICS OF HOUSING.

Pure economic theory would hold that in a free enterprise economy, the allocation of resources in the housing market would be most efficiently achieved if perfect competition amongst suppliers prevailed. In such circumstances producers would reap normal profits while consumers would reap the price benefits of enforced efficiency in supply. Resources would also not needlessly be diverted to or from the housing market.

The essential elements of perfect competition according to Lipsey and others (* 43) are :-

(i) Easy entry of suppliers to the market.

(ii) Perfect knowledge on the part of producers (* 44) and consumers alike, on the state of the market.

(iii) Availability of close substitutes for the goods and services, which in this case would be alternative forms of housing.

(iv) The presence in the market of many producers and many consumers.

(v) Uniformity of the product offered.

For our purposes it is not necessary to further explore item (i), for an examination of the Cape Town housing market reveals that there are many kinds of producers of housing of each type, and these producers range from the so called "spec" builder operating on a minimum budget and a quick sale basis to the large companies such as De Jongh, W.J.M. and Leon Pascall. There is no indication that unusual difficulty exists in attempting entry to the market. Indeed, the only prerequisite is the availability of

sufficient ... / 17.

sufficient funds, much of which could be loan capital and this can be raised from a number of sources equally readily by all. The necessary skills for developing are available to all via professionals such as accountants and architects, and competitiveness is at a fairly high level in the building trade.

There is also a plenitude of consumers, by the nature of the case, so that item (ii) will not merit further pursuit.

One of the fields in which perfect competition is hindered is that of perfect knowledge, especially on the part of consumers. Housing is one of the few markets which cannot concentrate at one place, and the unfortunate consumer is presented with an extensive area which must be traversed in order to view all the goods offered. In larger markets it is impossible for a consumer to cover the field by the traditional methods and consequently plain fatigue will force most to either stay out of the market or to buy within the restricted section which they are able to view. (* 45)

Estate agents are well aware of this problem, and while competitiveness exists amongst the latter, their best interests are served by rapid turnover, which encourages them to improve consumer knowledge. A consortium of Cape Town Estate Agents have been investigating the possibility of alleviating the problem by using electronic data storage and processing methods operated from a central plant. This system would enable consumers to rapidly elicit the state of the market and to narrow the field to manageable proportions, and would if implemented considerably improve the state of consumer knowledge of the market.

As will be seen later in this document, it is in the field of the availability of close substitutes that the local housing market tends most to imperfect competition and therefore towards monopoly or oligopoly. (* 46)

Grisby has drawn attention to the concept that if housing is a single market, then there are all shades of submarkets within it. (* 47) It is in the nature of

the ... / 18.

the definition of perfect competition that the product in each submarket should be uniform and that close substitutes should be available in proximate submarkets. Thus the housing market may be viewed as a continuum for the purpose of this concept; substitutability can operate at many levels - freehold vs. leasehold, cottage vs. terrace house, urban vs. suburban, motorcar oriented vs. transit oriented, socially oriented vs. privacy oriented; and so on.

Grigsby (* 48) charges that housing markets generally are inclined to be viewed overall, a fruitless pursuit since statistics are likely to show that all the population are housed, which gives the impression that there is no surplus demand (and likewise no surplus supply). These statistics, he says, may and generally do conceal considerable shortages in some markets, and considerable gluts in others. (*49) The reason for this is that the various submarkets are so well defined that there is no close substitute market for each, with the result that consumers are offered Hobsons choice and so expand or contract their requirements, concertina like, within the available supply.(* 50)

A reservation should be made here about the nature of substitutability. Those already in possession of housing goods will not move for fractional advantages, considering this not worthwhile. In their case, substitutability will occur into relatively unrelated markets, unless they are replacing old stock. Thus, in the view of such people, the housing market continuum is a fairly widely spaced one.

If one accepts the economic soundness of this concept of substitutability, then we may ask, does the Cape Town market in housing have the capability to meet the specifications we have stated, or is the market force distorted and provented from operating to these specifications.

Before going into this question, it is necessary to relate the concept of individual dwelling units to that of the perfectly competitive market. Doxiadis (* 51) views the unit which we have called egospace as being a kind of cell,

and ... / 19.

and he argues that cities are built of these cells just as an organism is, in a sort of series of hierachies which are allegorical to the organs and other parts of the body of an organism. He has been criticised for extrapolating from this organic allusion. The writer will use here a similar kind of concept, but its logic will be derived from the definitions made earlier, rather than depending on allegory.

Two elements were previously isolated, the individual and his egospace, and these two directly related to each other. One would expect a considerable variation in type of both egospaces and individuals, but one would expect that the egospace and the individual would in each case be adapted to each other. Thus the variety of dwellings would match the variety of individuals, if all are to be suitably housed.

We have pointed out that an egospace may not only be confined to non-living elements, but may and frequently does include another individual in its components. Thus the egospace of a baby may not only consist of a crib, and a baby bath, and parts of a house and so on, but will also include a mother and father as a rule. The egospaces of the mother and father will overlap that of the baby, and will include the baby.

If the whole compound of egospaces which overlap are taken together, then one has a Household. Clearly, a Household may incorporate a single individual or a number of individuals, and the variety of individuals which exist, along with each one's egospaces (environments), when combined in all possible variations, will constitute a formidable variety of Households. (* 52)

It is, of course, not possible to refer to this variety of demand as demand in an economic sense, since that term has no meaning unless related to the willingness of suppliers to supply at a given price. We would thus expect that some of the demand for variety of homes would be pinched off by the price mechanism.

One ... / 20.

One would also expect that there would be a tendency for economies of scale to lead to a uniformity of homes being supplied. Common sense tells us, however, that the income diversity of a population such as that of Cape Town would lead to a hierarchical diversity of demand. In any case a substantial economy of scale does not exist in a building industry which is characterised by many small competitive firms. Their very competitiveness would suggest that a high proportion of opportunities would be explored, leading to greater diversity in the housing stock.

It therefore seems reasonable to presume that the population would demand, and the market should be capable of supplying, a variety of homes.

LACK OF SUBSTITUTABILITY IN CAPE TOWN.

We may now make the following statement about the Cape Town Housing Markets :-

> " Either there is an order of substitutability between the markets such as would be anticipated under conditions of Perfect Competition, or there is not."

This statement must be correct, but in order to establish which part of it is correct, it is necessary to rearrange its form in such a way as to permit of measurement. In order to do this, two new findings about Cape Town will now be introduced.

FAMILY SIZE DISTRIBUTION AND MEAN INCOME VARY GREATLY FROM ZONE TO ZONE.

There is nothing unexpected about this, and the correctness of the statement will be demonstrated in due course.

If ... / 21.

If it is true and if a reasonable range of housing in each zone is available to choose from, then :-

i) The areas in which the highest income groups are to be found must be those best suited to them, since the latter have the greatest capability for satisfying their own demand by price competition.

ii) The variation in the pattern of Household size distribution must be due to the ecological suitability of sub-areas to Households of particular size.

iii) Therefore the wealthiest people are unlikely to select their housing from all the areas rather than from those areas alone which are best suited to their family size.

iv) Therefore the wealthy areas will not have homogenious Household size distributions, since some will be better suited to small Household size, others to large, and so on. (* 53).

The above arguments depend on three hypothesis being correct. These are :-

A. That Cape Town displays great variation from zone to zone in the distribution of Households of different sizes.

B. That Cape Town displays significant variation from zone to zone in the distribution of Mean Household Income. (* 54)

C. That the areas in which the highest income groups in Cape Town live, display significant variation in the distribution of Household's of various size.

Proposition ... / 22.

Proposition - A - was tested by the Chi-Square homogeneity method, and the level of Chi-Square as calculated far exceeded the expected value, demonstrating that their was indeed no homogeneity, and that the proposition was correct. The Test (T5) is given in the appendix. (* 55).

Proposition - B - was demonstrated by the variation in the calculated means, which are given in the appendix. (* 56).

Proposition - C - is tested here by the homogeneity method of Chi-Square. If this proposition should prove to be incorrect, then there is no alternative but to conclude that the size of their territory precludes many a Household from living in the zone of their choice, for lack of a suitable range of subdivisions in such zones.

TESTING THE HYPOTHESIS :-

> " That Household Size Distribution varies significantly from zone to zone, but the Household Size Distribution of the High Income Group is homogenious throughout the zones."

Test T5 shows that the Total Household Size distribution is not homogenious throughout the zones.

The homogeneity of High Income Group HSD was tested by the Chi-Square method, using again the Income and Household size data from the MRA survey.

Two tests were done. In the first the six highest Mean Income Areas were selected, and the family size distributions in these areas were tested against each other for homogeneity, having been split into the same small/medium/large categories previously used. The expected value of Chi-Square at the probability level 0.9 and with eight degrees of freedom was 12.02, and if the calculated value exceeded this, then the propostion of homogeneity was to be rejected. (* 57).

The ... / 23.

The calculated value was in fact 10.741, and it was therefore concluded that the HSD in these areas was homogenious.

For the second test (T6) the highest Mean Income Area in each zone was selected, the appropriate areas being, in descending order Nos. 1, 10, 12, 2, 14, 15 and 18. Again the Household sizes in these zones were split into the previous small/medium/large categories. The critical region of Chi-Square was 18.55 at the probability level 0.90 with twelve degrees of freedom, and the hypothesis would be rejected if the calculated value exceeded this.

TEST T6.

	HIGHEST MEAN INCOME AREAS							
HOUSEHOLD SIZE	1	10	12	2	14	15	18	Total
0 - 2 persons	11	6	23	16	18	28	9	111
3 - 4 persons	12	18	30	29	34	15	11	149
5 +	5	12	12	8	18	10	10	75
TOTAL	28	36	65	53	70	53	30	335

Calculated Chi-Squared = 18.031

The hypothesis is therefore accepted, and we conclude that the family distribution by size in these eight areas does not vary by an amount greater than would be expected to be found every tenth time the sample was drawn.

CONCLUSION:- "The Range of Residential subdivisions in each zone is not such as would occur under conditions of Perfect Competition."

It would appear that the Income Groups other than the High Income Group, when shopping for subdivisions to suit their Household size, are in many cases unable to find such in the zone of their choice due to an undersupply

in ... / 24.

in that zone of that size subdivision, and consequently are obliged to choose a zone where there is an oversupply of that size. In this way, the uneven distribution of Households by size has come about.

It cannot be said that this uneven distribution has anything to do with the degree of proximity to the central place or the transportation network leading to it, in which case Diagrams D1 and D2 would have resembled Isochrones about the CBD.

SPECIALIZATION AND EXTENT OF MARKET.

The question arises, "would the market, if not constrained by legislation, supply the needed variety of stock"? This is almost a rhetorical question if coached in purely theoretical terms, for we have already argued that a purely competitive market would tend to explore every available opportunity.

However, as Adam Smith was wont to say, "the degree of specialization is determined by the extent of the market". In terms of our problem, this would imply that a small housing market would display little variety, while an extensive market might not. But we have argued for a high level of substitutability, which means a great variety of housing even at the neighbourhood scale. It is clear that this is incompatible with Smith's dictum, but a relatively small variation within each neighbourhood along with a larger variation within an aggregate of neighbourhoods, is compatible. It might be pointed out here that the range of territorial subdivisions to which we referred earlier, is indeed not very great and might easily be offered.

It is difficult to escape the conclusion that the suppliers are not responsible for such monopolistic barriers as exist between various submarkets in the housing market.

THE ... / 25

THE DETERMINANTS OF MONOPOLISM.

Speight (* 58) comments that "Imperfect Competition is likely to be less efficient than Perfect Competition ..... also ..... less equitable."

We have been concerned here with subdivision sizes and have demonstrated imperfections in the availability of substitutes in various zones of Cape Town. In this sense, the market tends to monopolism.

The suppliers of the land are and have been entrepeneurial by character, but the product which they market is strictly controlled both by law and by official institutions.

In another sense, the officials who administer and determine the Town Planning Controls are monopolists, similar to the "natural monopolists" of the old economists, who held that matters such as transit systems, electricity supply and the like were matters of Public Concern, and as such were natural (or Public) monopolies.

There are thus three distinct factors which can affect the supply side of the Territorial Market, being the suppliers, the law and the officials who have been granted the power to judge the merits of the proposals of the suppliers. We have accepted that the consumers are desireous of and able to consume a greater variety of territory than that offered by the market and therefore it is likely that this inequity is due to one of the three supply factors, possibly in combination with other factors.

Let us work from the assumption that suppliers would supply the variety justified by market conditions. It is therefore the laws and the officials who are responsible for the inequities observed.

THE ... / 26.

THE CHANGING NATURE OF SUBDIVISION.

In our legal system, the subdivision of land in the urban process is a serious matter, not lightly undertaken and not readily altered.

The land is initially subdivided from non-urban land and has a set of controls placed upon its use. It may be further subdivided, or rearranged, and the controls may be altered, but at the expense of a considerable degree of effort.

We might then argue that the Cost of the Effort should not exceed the benefit gained by adjusting the subdivision or controls.

It would be tedious to trace here the complex process which must be followed by law to achieve such adjustments (*59). We can however conclude that the capacity of the process is so low as to preclude adjustment to most subdivisions on an individual basis.

To demonstrate this, let us construct a little model. If we assume that the process through which an adjustment must pass involves the conservative estimate of 100 man hours of official time, and we presumed that every house subdivision in Cape Town was in need of adjustment every tenth year, and since there were 54, 707 single houses in Cape Town in 1960 (* 60) then 547 officials would have been required at 1000 annual manhours each to administer to the needs of Single Residential Zonings alone.

It is reasonable therefore to presume that the cost of adjustment is so high as to preclude all except such matters as rezoning for flats etc.

Grigsby (* 61) speaks of a "ferment of ..... movement ..... as the inventory is continually adopted to the changing requirements of society. In no other sector of the economy is there a comparable phenomenon."

In ... / 27.

In terms of our rule that "Household size stands in constant relation to Territorial size" we are able to state that when territorial size cannot be adapted, then the Household size will adapt to the size of territory.

Thus a territory suited to (say) five persons would be suited to a family of five, or two families of three and two respectively. In the latter case the territory might well tend to be split in effect into two smaller territories. Similarly, if the Household of five tended to increase (due to birth, perhaps), then the inflexibility of the territory would lead to the expulsion of some Household members in order to adjust Household size back to its predetermined level, or else the Household will seek new, larger territory.

In short, we might state that an inflexible system of subdivision will increase the tendency of families to be split, or of unrelated families to occupy the same territory, and will increase the tendency for families to move to new territory.

With regard to the sharing of a territory by two families, thus tending to subdivide the territory, it may be observed here that such tendency is thwarted by the Cape Town Planning scheme under sections 15 (2), 25 (2) and 102 (1), which preclude houses built since 1940 from conversion to double dwelling units (i.e. seperate entrances) while houses built prior to 1940 may be so converted provided their "external appearance is not altered" and the floor area not increased, inter alia. (* 62)

We might thus conclude that the present mechanism for controlling subdivision of Residential land in Cape Town is incapable of meeting the changing demand pattern which arises out of family growth, family decline and population movement.

THE ... / 28.

THE BARRIER BETWEEN THE MARKETS FOR FLATS AND HOUSES.

The Provisional Town Planning scheme of October 1950 (* 63) gives over 1,900 acres in the southern suburbs to flat development "capable of housing 360,000 persons." (i.e. 190 persons per acre). By contrast, the town planning scheme (* 64) does not permit single residential subdivisions of less than $\frac{1}{8}$ acre, and since we know that the prescribed Household size for this is not more than 4 persons, the maxium density is 32 persons per acre.

We might therefore suspect that the proposed flat density far exceeds that desired by the population.

The present degree of flat development falls far below this level, but, it is common cause that developments of sites zoned for flats rarely fall short of the maximum permitted bulk. (* 65).

The picture is that of only a small proportion of the zonings which have been exercised, and those mostly to the limit of bulk permitted.

It is not unreasonable to conclude that there is a tendency for a gap to be opened in the continuum of net densities. This gap occurs between the maxium density of Single Residential Housing and the minimum density of Flat Developments.

The author knows of no provision in the town planning scheme or any other Act or Ordinance which specifically prevents the development of low density Flats, although Terrace Houses are not permitted. (* 66). It would appear therefore that the imperfection is due to an unwillingness on the part of suppliers to develop such low density accommodation.

Two reasons may be advanced here to explain this. These may be referred to as the "promise" of General Residential Zoning, and the effect of Rent Control on the attitudes on suppliers.

THE ... / 29.

THE PROMISE OF GENERAL RESIDENTIAL ZONING.

As we have seen the density of General Residential Zoning far exceeds the present demand structure. We thus may expect that either :-

* All the GR Zones will be developed, but to a level below that permitted.

* Some GR Zonings will be developed to the maximum level permitted, while the rest will be developed to a level sufficiently low to compensate for the high level of development in the former.

* All the available capacity of the market will be concentrated into some GR Zonings which will be developed to their capacity, while the rest will remain undeveloped.

We have observed that there is a tendency for the last of these three to occur.

The reasons for this are not hard to find. Consider for instance the effect of growth on the first possibility. At the first stage of Urban Growth, all the GR Zonings would be developed to a low level of intensity. Then as growth occured, each of these would need to increase their density until the maximum permitted bulk was reached.

In a situation of fairly rapid growth, then, frequent alterations and additions would be needed to the GR inventory, and the diseconomies of this would tempt certain owners to delay conversion of their properties. They would expect to be able to miss out a step or two in the alterations and additions process, and to combine these into a greater and more economic development at a later stage. Interim spare capacity in the demand market would then be satisfied by other owners who could develop their properties to a level higher than they would otherwise have been able to do. They have thus also missed out a step or two.

In ... / 30.

In larger developments, the marginal short term benefits of overdevelopment in anticipation of future demand will lead developers not only to miss out an arrear step or two but also to take an anticipatory step or two, thus increasing the gap between their developments and those which are lagging behind.

The logical consequence of this process will be that developers will tend either of develop a General Residential Zoning to its maximum extent, or else will hold their land in present use in anticipation of future demand "promised" by the zoning.

In this way we can explain the imbalances in the degree of development of General Residential Zonings.

However, this does not explain the degree of territorial subdivision which would occur.

For instance, we cannot say how a site of 20,000 square feet would be subdivided into rental accommodation. With a bulk of 0.25, the maximum floor area permitted would be 4,000 square feet. This would permit 4 flats of 1,000 square feet each (i.e. four territories of 5,000 square feet each), or ten flats of 400 square feet each (i.e. ten territories of 2,000 square feet each). (* 67).

RENT CONTROL WILL CAUSE RENTAL ACCOMMODATION TO BE OF GREATER NETT DENSITY.

In the following analysis it will be demonstrated that the imposition of Rent Control will lead to an upward shift in the rents of non-controlled premises, which will shift demand towards smaller premises, and consequently towards smaller territory. A value will be placed upon the degree to which this will occur.

THE ... / 31.

THE EFFECT OF RENT CONTROL ON THE HOUSING STOCK.

Consider the hypothesis: "the freezing of the rents of living accommodation in a free market economy which normally experiences a moderate degree of inflation, will lead to a shift in the kind of accommodation offered on the market, and that this shift will turn out to be towards more modest accommodation and away from more extensive accommodation, provided that consumer expenditure on rent is not relatively altered".

Economists widely agree that rent control as practised in this country, in Britain and France and previously in the United States represents an interference with the free workings of the enterprise market, which must consequently lead to distortions. (* 68). Since price, which in this case is rent, is determined by a state of equilibrium between supply and demand, then any adjustment of price by outside agency will lead to contrary adjustments to both supply and demand, bringing these latter into a state of disequilibrium. Resources will no longer be allocated to the housing market by the price mechanism, but will be diverted to or from it to the extent of distortion.

Thus we would expect that an enforced general decrease in rent would cause consumers to wish to consume more accommodation at every rent, while suppliers would be unwilling to supply the same amount of accommodation as before. This would open a gap between the level of available accommodation and the level at which consumers would like to consume it.

All this has been adequately discussed by various authorities and need not be fully explored here. However, the effect of the diversion of resources from the leasehold dwelling market is of concern to us here, inasmuch as it affects the quality and type of dwellings in this market.

The economists who have been critical of rent control have explored a great number of avenues, tracing out innumerable ramifications, both inside and outside the housing market, but this writer has been unable to trace any quantification of the extent of the effect of price fixing in rent controls on the market. For

instance, ... / 32.

instance, it is widely assorted that a decrease in rent must lead to a decrease in supply of new stock plus a decrease in quality of existing stock as well as an increase in demand, but there is no known measurement of the extent of these effects.

It has therefore been concluded that a model constructed so as to demonstrate these quantitative relationships wouldbe useful and it is hoped that this model will also demonstrate the depressing effect which rent control would have on the quality of the dwellings stock.

The logic of the model is as follows :-

A landlord who is unable to increase his rentals, and therefore unable both to take advantage of temporary scarcities and to offset the erosions of inflation as well as being unable to reap the benefits of a location experiencing growing demand, will attempt to convert the asset to some other more profitable use. If it pays him, he will sell into the freehold market, or he will occupy the premises himself, or he may simply offset his loss of revenue against expenditure on maintenance and the like. Thus the property will either be withdrawn from the rented dwelling market altogether, or will be allowed to decline and decay up to a point where its thus decreased value will match the enforced decrease in rent. Multiple unit buildings cannot readily be diverted to another market, and will instead tend to fall into decay, but will remain as part of the stock until demolition becomes necessary. The life of such buildings is thus shortened, and rent control contributes to urban decay.

At the same time demand for the dwelling stock increases, as it has become more reasonably priced. The demand will be in respect of both quality and quantity, towards better appointed and finished accommodation in more desirable areas, and towards a lower person per unit area ratio.

Those ... / 33.

Those in possession of controlled premises will be more reluctant to give them up, even after they have lost the need for some of the facilities of the premises, as in the case of aged couples whose children have left home, while those seeking possession will compete with each other on a basis other than price bidding, so that the premises will not necessarily be allocated to those most in need of and therefore willing to pay the most for such premises.

Entrepeneurs, seeking investments, will tend to invest in a market which will yield the highest return. It is generally agreed that return is directly proportional to risk, that is to say, high returns are yielded by risky investments and low returns by fairly safe investments. In a sense, entrepeneurs regard risk as a cost.

The possibility of the imposition of rent control is a risk faced by those who invest in the property market. Thus they will attempt to offset this risk against additional revenue over and above that which could be gleaned from another investment market, or else they will not invest in the property market.

In recent years, rent control in South Africa has taken the form of a "freezing of rents" as they stood at a particular date. The most recent, "freeze" occurred on May 31st 1965, and all rents being charged that day become maximum rents and may not be increased. Since inflation has occurred steadily since that day, the revenue of the landlords has thus been eroded. In the words of the investor, these premises and those "frozen" at earlier dates have "shown no growth". The premises have become wasting assets, since an artificial amortization factor has been introduced, over and above that which normally is associated with wear and tear and obsolescence.

This amortization factor is closely tied to the rate of inflation, and the investor will tend to estimate the amortization from observed and expected inflation.

He ... / 34.

He will estimate the useful life of the building, compute the expected loss due to the erosions of inflation in the event of rent control, and will reduce this to a monthly rate to be added to the rent.

The nett effect of the threat of rent control will thus be to increase the rents of non-controlled premises. Since those premises already controlled will tend to deteriorate more rapidly or to be withdrawn from the market, thus causing surplus demand, it will be possible for entrepeneurs to cater for this surplus demand and at the same time to cover the amortization factor.

THE MODEL.

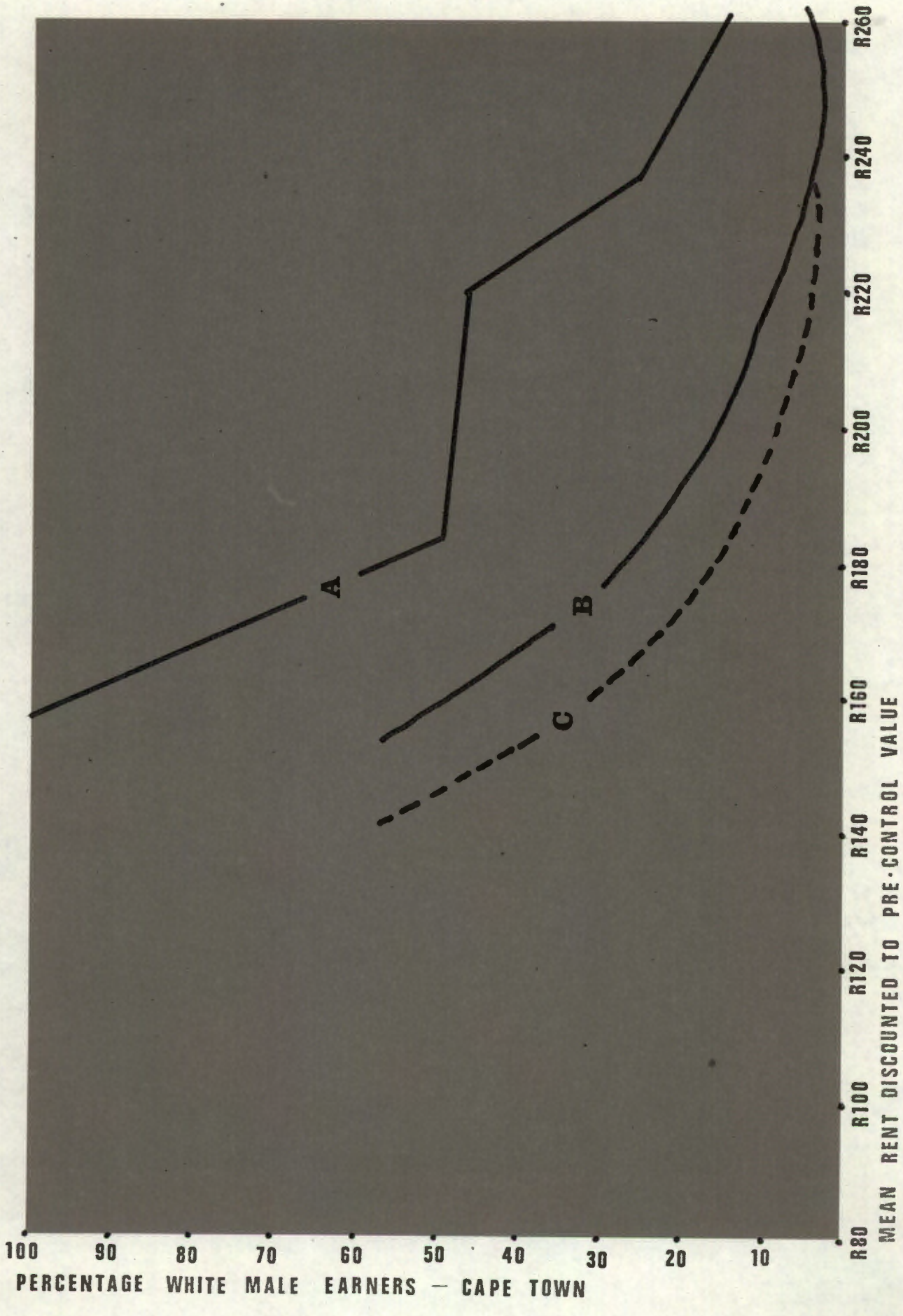
In order to demonstrate the order of magnitude of the effects of a rent "freeze", the following procedure was followed :

Data was derived from Pienaar and Associates, which gave the 1965 expenditure pattern of a sample of White South Africans in seven cities. (* 69) This data gave average expenditure by income groups on rent, inter alia. The rent was necessarily an average, as some of the interviewes paid no rent, and so must be regarded as relative rather than absolute. This data was blended with statistics derived from the Department of Census and Statistics (which gave estimates for the number of White males in each income group in Cape Town for 1967), (*70) so that an estimate could be made for the proportion of the population paying each rent._

This data was accumulated and expressed on the cumulative frequency graph A, (see diagram), and in which the various rent averages are graphed against the number of people who pay that rent or less on the average.

Clearly, graph A can only be regarded as approximate, being based on the assumption that the national rent/income ratio is the same as that for white males in Cape Town. The graph is however good enough for the purposes of the model if its shape is reasonably characteristic and for present purposes it is assumed to be so.

Graph .../ 35.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PERCENTAGE WHITE MALE EARNERS — CAPE TOWN
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R140
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R220
R240
R260
MEAN RENT DISCOUNTED TO PRE-CONTROL VALUE

Graph B shows the same data as graph A, but in a non-accumulated form.

Now let us assume that the supply of stock represented by graphs A & B is subjected to a rent freeze and that inflation occurs at the rate of 2.1/4% per annum (a conservative figure), so that at the end of four years the value of the rents is devalued by 10%. Since the value of the premises must be linked to the rents gleaned, the stock will have suffered a 10% decline in value.

Graph C thus expresses not only the adjusted value of the rents but also of the stock.

(1) Since we have argued that the landlords (who are in this case not monopolists and therefore not earning excess profits) will adjust the value of the stock through decreased maintenance and service and through withdrawal from the market, we conclude that Graph C represents also the value of the premises and the quantity thereof supplied 4 years after the introduction of rent control. Although it is in fact unlikely that landlords will be able to fully adjust the value of the stock to the level of Graph C, it may be assumed to be a fairly likely proposition in an economy which expands faster than inflation, thus increasing rental capacity on the part of the consumers, and since the locations of the premises are likely to prove more attractive and therefore valuable, and therefore capable of carrying increased rentals with the growth of the urban complex. The estimated erosion of rent of 2.1/4% assumed is therefore likely to represent the minimum case, and Graph C therefore is conservative.

(2) Graph D represents the difference between graphs B and C, which is the excess of demand over supply. This is the average number of people at each rent who are unable to, although desiring to, consume accommodation.

Assume further that the population has grown at a total rate of 8.1/4% over 4 years and that this rate is spread evenly throughout the range. 8.1/4% is derived from the estimated growth rate of Cape Town from 1960 to 1967

according ... / 36.

according to the Department of Census and Statistics. (* 71) If this is added to Graph D then one gets Graph E.

Although the assumption that the population growth is evenly spread throughout the range is not necessarily true, it can be seen from Graph E that quite a large error would only have a negligible effect on its shape.

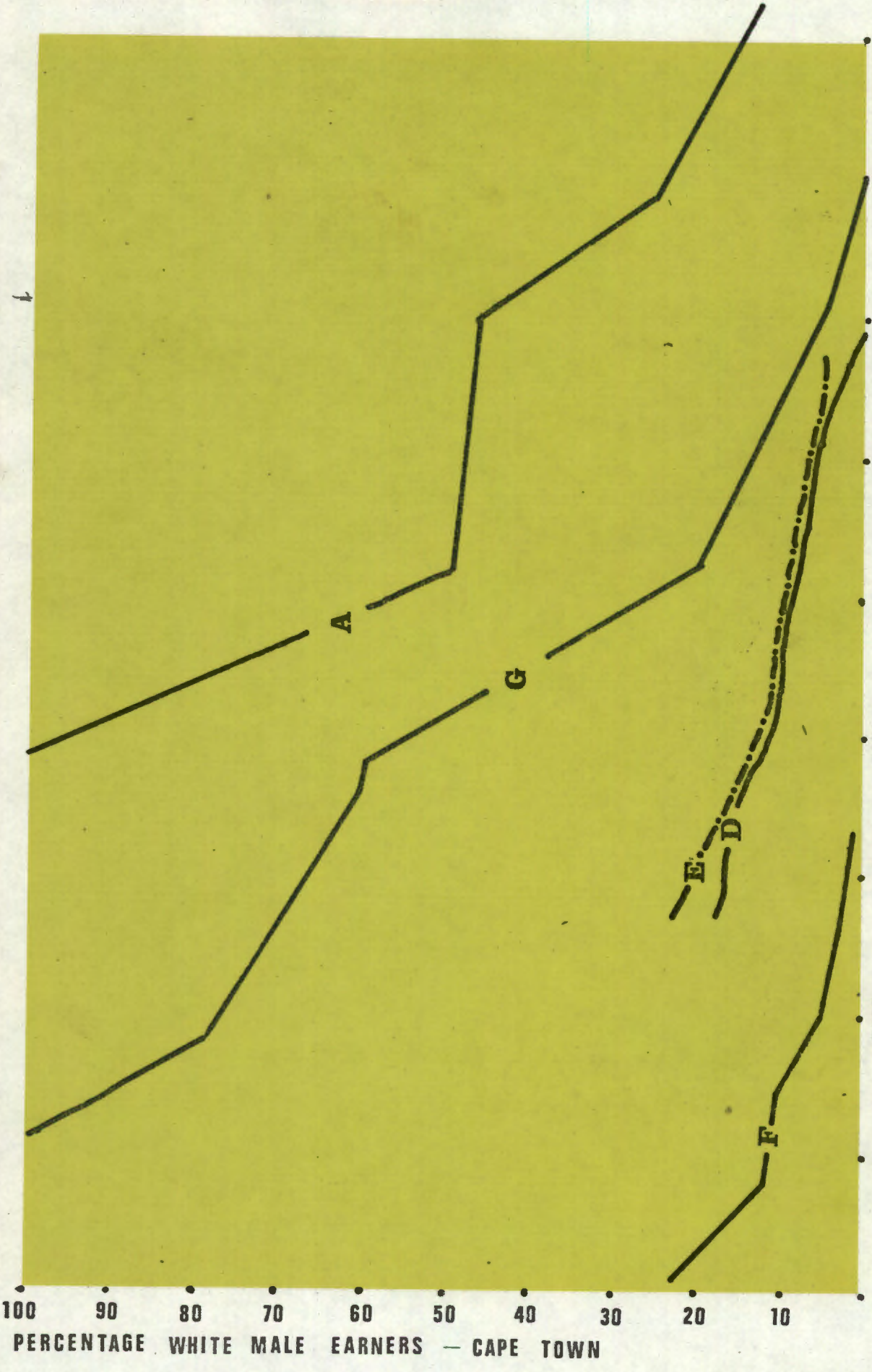
Graph E now represents the unsatisfied demand four years after the introduction of the rent freeze. How is this demand to be met ?

Under ordinary circumstances, one would expect some of the displaced or unplaced persons to substitute into the freehold market, while others would be forced to substitute into higher rent premises. It seems probable, however, that a high proportion of these persons will be unable to substitute into freehold, lacking the capital to do so, so for the purposes of developing our argument, it is assumed that no such substitution takes place. Since, graph C is intended to represent the total market now under rent control, the excess demand must be met by new supply.

Graph E represents the unsatisfied demand for a certain quality of premises at each rent. However, we have argued that investors are unwilling to offer new accommodation of that quality at each rent, due to the threat of the extension of rent control. Thus we may expect that the market will offer the accommodation somewhere between two extremes, either by downgrading the quality of the premises offered at each rent, or by upgrading the rent charged for each quality of premises, or both.

The question of how much the investor will allow for writing off against risk of rent control is a difficult one. However, it seems reasonable that he will not allow less than 3% per annum for rent control amortization, a figure which has frequently been exceeded (*72).

The ... / 37.


A
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MEAN RENT DISCOUNTED TO PRE-CONTROL VALUE
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PERCENTAGE WHITE MALE EARNERS — CAPE TOWN

The amortization takes the form of compound percentage reductions, so that it takes an infinite period of time for the value of the investment to reach zero. Since the useful life of any building is much less than this, the investor is likely to use "useful life" as his criteria for computing the amortization. Thus, if one assumes a useful half life of fifteen years, and bases the value for rent computation purposes on the amortized value at this age then it seems that a reasonable approximation would be made.

At 3% annual erosion, the value of premises 15 years hence will be 64.18% of initial value. (*73) So it seems safe to assume that the entrepeneur will regard an economic rent in a free market as being 60% of that in a potential rent control market. Thus he would overvalue his rents by $\frac{100}{60}$ or 166-2/3%. If it is thought that this estimate is exorbitant, it must be pointed out that a further risk faces the South African landlord, that his rent may be calculated by the Rent Board on the basis of a valuation placed upon it by them. Penny asserts that those valuations made by the Rent Board to date are "greatly below those which would prevail if controls were lifted." (* 74) It seems reasonable that in the face of such a risk, entrepeneurs will attempt to recover a very high proportion of their investment before their premises got valued, so that in such a case the rents are likely to be priced even more than 66-2/3% above normal. Faced with such an increase in prevailing rents, what would be the reaction of that part of the market without accommodation ? Although it is pure conjecture, it seems reasonable that most consumers will be unwilling to greatly increase their expenditure on rent, and will therefore prefer to substitute to the freehold market, but lacking the resources to do so, will prefer to accept a "temporary" solution by making more extensive use of less space at their preferred rent.

If this assertation is correct, then one would expect to observe that new building stock leans towards the tendency described.

If Graph E represents unsatisfied demand, and this demand is met on the basis of 3% amortization for 15 years, then Graph F represents the rental

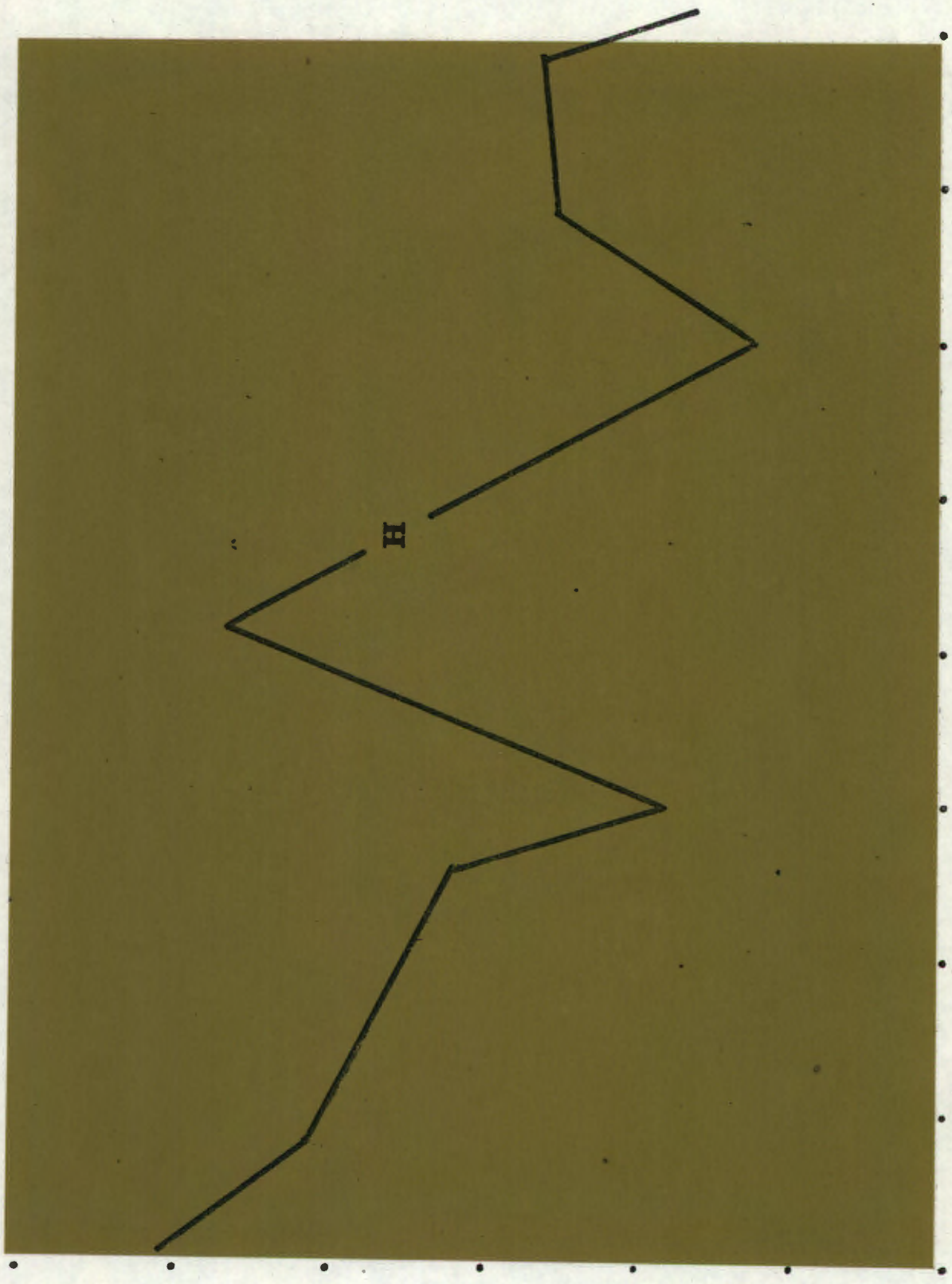
value ... / 38.

value of such accommodation if the distortions due to the threat of rent control were not present. It will be observed that the Graph F falls almost wholly below the Graph B in terms of rental value.

It is now possible to accumulate the total stock presumed to exist after four years, valued at pre-control levels. Graph G does this, and is plotted with graph A to show the shift in the kind of accommodation offered. As Graph A is already presumably affected by rent control, it seems safe to suggest that Graph G is by no means extreme. That is to say, Graph A expresses actual rents paid, but must, if our analysis is correct, already conceal some of the tendencies of Graph G with regard to equilibrium values.

For ease of reference, the extent of the shift between graph A and graph G is plotted on Graph H.

The writer would therefore conclude that the hypothesis stated at the beginning of this chapter is correct, and that the implementation and threat of implementation of rent controls not only leads to considerable deterioration of the rented dwelling stock, but biases the market markedly in the direction of intensive use of minimal space resources and facilities.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MEAN RENT PER PERSON
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PERCENT WHITE MALE EARNERS
AS INCREASE OR DECREASE

APPENDIX.

* 1. The Scientific Method was attempted throughout the preparation of this thesis. The following quotation sums up the approach :-

"One could gather facts and suspend judgement as to what meaning they might eventually have. This sounds like a fine idea and it has even been hailed (following Bacon, who never succeeded in making a discovery by his famed inductive Method) as the procedure in science. In reality, gathering facts, without a formulated reason for doing so and a pretty good idea as to what the facts may mean, is a sterile occupation and has not been the method of any important scientific advance. Indeed facts are elusive and you usually have to know what you are looking for before you can find one."

- George Gaylord Simpson Lectures on Religion in the light of Science and Philosophy. (25th series of Dwight Harrington Terry Foundation Lectures. Yale University.)

* 2. "The series of resulting fields of knowledge brought to a focus on building construction and use might be labeled (sic) as follows :

1. The natural and physical sciences.
2. Engineering and technical knowledge.
3. Economics.
4. Laws and regulations.
5. Humanities and behavioural sciences.
6. Design and planning, and
7. Manufacturing and construction."

- J. Milson. The Planning of a Housing Complex.

*3. / ... ...

* 3. "Rational and blase as we may be, and scornful of any thought that there is a "ghost in the machine," we still believe deeply that life is governed by forces that have their roots in the sky, soil and water around us. And there is, in fact, a profound bioligical basis for this belief. Many basic biological rhythms in man, such as body temperature, hormone secretion, blood pressure, vary with the seasons or other cosmic forces. All of these fluctuations ..... probably derive from the fact that the human species evolved under the influence of cosmic forces that have not changed."

- Rene Dubos Mere Survival is not enough for Man (Life Vol. 49. No. 3. 4)

* 4. That this set of forces is developing towards three dimensionality is suggested in :-

- C.A. Doxiados Man and the Space Around Him (SR. December 14, 1968.)

* 5. In this regard a confidential planning report begins with the following :-

"Society now has the technology to do just about anything to the land that any individual or societal purpose can justify. When these demands upon the land tend to run counter to the natural capabilities of a given area, an additional cost may be in terms of the cost potential, amenities or structure of the land in terms of the extra resources that will be required to overcome the limitations of the site for a particular use."

* 6. Ecology is "the Science which deals with the relationship of organisms to their environment. In a broad sense, all ecology is homo-ecology, in as much as man is the dominant organism in the biosphere and all other organisms are more or less in his influence."

- W.L. March Landscape Vocabulary.

* 7./ ... ...

* 7. Howells speak of "Environmental Niches" within the whole environment, in which animals adapted to them by special ways of life, or opportunities, are subjected to a restricted degree of competition. (In this sense then, ecology is the study of an individual in relation to its environmental niche).

- William Howells Mankind in the Making. (London. Mercury Books No. 55 1964. 353.)

* 8. "There is no such thing as a purely biological nature of man ..... Tools, hunting and farming, familial and social structure, even religion, art and science all have played a part in the genetic molding of man ..... Because he evolves with his culture, man needs human culture for his survival and self actualization ..... culture patterns constitute designs for human living."

- Rene Dubos Man, Medicine & Environment (Pall Mall Press, London 1968. 47)

* 9. Environment includes not only the physical inanimate objects and substances around and about an individual, but also the living organisms, both plant and animal which exist around and within him, and the cosmic forces which exert their influence upon him, and the cultural patterns which seek to condition him.

* 10. In another sense, egospace is a cultural concept. People acquire the idea that they must have a home environment, within which there are objects and substances which they personally command, and where they expect others of their culture to respect their privacy.

* 11. The concept of the territorial instinct is well known, and it has an appeal about it when applied to Man. Ethologists have isolated and measured it in many animals, particularly birds, and have demonstrated its significance

to / ... ...

to these species. However, many species appear to have no territorial instinct at all or else one which is hardly developed. One should therefore in the absence of quantified evidence, be cautious of this concept when applied to man. In our case, however, it does not matter if the idea is instinctual or culturally aquired in man, because the purpose of presuming that such an idea influences people in their housing choice was to test such an hypothesis.

* 12. "A household is the entire group of persons (whether or not related) who are living together, or a person living alone, in one dwelling unit."

- Paul C. Glick. Family Statistics, in "The Study of Population - an inventory and appraisal" edited by Phillip M. Hauser and Otis Dudley Duncan. (University of Chicago Press 1959.)

The Town Planning Scheme defines "Family" as :

a. A single person maintaining an independant household, or

b. Two or more persons related by blood or marriage maintaining a common household, or

c. Two, three or four unrelated persons maintaining a common household

And ..... includes not more than 5 persons lodging or boarding with a family.

- Provisional Town Planning Scheme. Municipality of Cape Town.

* 13. Diagram ADI explain the philosophy which lies behind the reasoning of the concept.

* 14. / ... ...

* 14. "The well-being of man in influenced by all environmental factors; ..... Health is the expression of harmony amongst the environment, the ways of life, and the various components of man's nature.

- Rene Dubos. Man, Medicine and Environment (Pall Mall Press; London 1968. 53).

* 15. Quotation from the Hippocratic Oath.
In this regard :-

"Both men and animals achieve health most readily after many generations of life in a stable environment."

- Rene Dubos. Man, Medicine and Environment. 71).

* 16. "As many persons fail to meet successfully the adaptive requirements created by ..... rapidly changing conditions, numerous and varied pathological states emerge, despite an increase in comfort and presperity."

- Rene Dubos. Man, Medicine and Environment. 72).

* 17. This adaptation occurs both during the lifetime of an individual, if the organism has the capacity within its physical structure to do so, and also from generation to generation as the structure of the gene pool of a species is altered by the inherited favourable genes of successful individuals.

* 18. Ethology is the science of the study of animal behavioural traits.

* 19. / ... ...

* 19. L.F. Shaffer & E.J. Shoben Jr. The Psychology of Adjustment (The Riverside Press. Cambridge, Massachusetts 1956. 3-18, 246-54, 360-87)

* 20. See Appendix * 15.

* 21. Lamarck argued that environmental stimulae acted upon organisms and thereby favourably altered their structure, and that these structural alterations were heritable. For instance, rabbits had started with small ears, but the need for them to hear approaching predators caused them to stretch their ears. These slightly stretched ears would be inherited by their offspring, who would continue the process, until rabbits had long ears.

Darwin incorporated this concept into his "Origin of Species" and in the scientific furor which followed the publication of the "Origin", Lamarck's concept was minutely examined and dismissed on the grounds that mutation was random and not deliberate.

Recent discoveries about the structure of genes and chromosones however, show that mutations occur during the course of the life of a creature (not prior to birth) and the respectability of Lamarck's conclusions are reinstated.

* 22. A famous example of symbiotic adaptation is that of the humming bird and the trumpet vine. Both the bird and the flower have shapes which suit each other. Neither physiognomy can be explained by itself.

* 23. "Larger units are subdivided into smaller units. Small dwellings are enlarged. Units shift from owner-occupancy to rental status. The characteristics of the occupants alter over time; a given unit may serve a family at different stages of its life cycle of different families in the same stage."

- William G. Grigsby Housing Markets and Public Policy. (University of Pennsylvanis Press 1963. 22)

* 24. Vapnarsky speaks of the "reciprocal adequateness of family to house and house to family," and calls this his "nuclear theoretical concept."

- C.A. Vapnarsky An approach to the Sociology of Housing. (Ekistics. August 1966. 127-135)

* 25. The Central Place may indeed be a diffuse thing of many points in space. Stegman speaks of location decision influenced by travel time to "Grocery, home of best friend, elementary school, downtown, shopping centre, park or playground,doctor's offiee, hospital, work, church."

- Michael A. Stegman. Accessibility Models and Residential Location. (JAIP January 1969.)

* 26. Doxiadis has a theory about the kind of forces of which we speak here, calling them "force mobiles". He argues that an individual locates according to where he wants to go, but a family wants to go to many more places and so has a more complex force mobile.

- Constantinos A. Doxiadis. Ekistics. An introduction to the science of human settlements. (Hutchinson. 1966).

* 27. "The family (with or without formal marriage) is (an) universal phenomenon, it serves as the basic social, sexual, reproductive, educational, and until recently, economic unit of a Society."

-Wilbur Zelinsky. A Prologue to Population Geography. (Prentice Hall. 1966)

"Two / ... ...

"Two fifths of the families occupying units in Chicago Housing Authority projects consist of a family head with a spouse absent and at least one child ..... ."

- Beverly Duncan and Philip M. Hauser. Housing a Metropolis - Chicago. (The Free Press 1960.)

"Only about half of the "families" that occupy the American Housing supply are husband-wife-child families."

- Martin Meyerson, Barbara Terret & William L.C. Wheaton. Housing, People, and Cities (McGraw Hill 1962).

* 28. Households of one person are frequently ignored in Planning Policies. However ... "Whenever possible, needs of students, apprentices, other single persons ..... (should be) taken into account ..... offered smaller flats, or flatlets or ..... in hostels."

- Housing in Britain (Central Office of Information, London. August 1960.)

* 29. " ..... the adult unmarried flat-dweller may have different requirements (from the married flat dweller). In a London Borough a block of flats was built with an attractive Communal clubroom, but it is rarely used because people are happy living alone if they have a home of their own ..... ."

- Loneliness : An Enquiry into Causes and Possible Remedies (Pamphlet. National Council of Social Services. Revised edition 1964).

"Physical distance has long been known to be a factor in friendship and marriage."

L. Festinger, / ... ...

L. Festinger, S. Schachter and K. Back. Social Pressures in Informal Groups. A study of Human Factors in Housing. (Stanford University Press 1963.)

* 30. Schmitt found in Honolulu that "High density per acre has some connection with high psychological and pathological disease rate ..... high density per room ..... a little less so."

- Robert C. Schmitt. Density, Health and Social Disorganization (J.A.I.P. January 1966.)

* 31. The M.R.A. data was made available in the form of a Computer printout, and included data on Employment, Occupational groups, number of earners per household, car ownership, size of ground, family size, Income, etc. The data was split into twenty three areas which were as follows :-

1. Fresnaye, Clifton, Camps Bay, Bakoven.
2. Green Point, Mouillie Point, 3 Anchor Bay.
3. Cape Town Central.
4. Cape Town Gardens.
5. Tamboerskloof, Oranjezicht, Vredehoek.
6. Gardens, Devils Peak.
7. Woodstock,
8. Milnerton.
9. Ysterplaat, Rugby , Maitland.
10. Pinelands. Thornton.
11. Observatory, Mowbray.
12. Rosebank, Rondebosch, Newlands.
13. Rondebosch East, Crawford, Landsdowne, Ottery.
14. Claremont.
15. Kenilworth, Wynberg.
16. Plumstead.
17. Diepriver, Heathfield, Bergvliet.

18. Retreat, Lakeside, Muizenberg, Kalk Bay.
19. Fishoek, Glencairn.
20. Goodwood, Vasco.
21. Epping Gardens. Elsies River.
22. Parow, Tiervlei.
23. Bellville.

The sample was a stratified random sample.

* 32. The MRA data was checked against 1967 figures for Wynberg, collected by first year U.C.T. M.U.R.P. students.
This was as follows :-

Household Size	1967 Survey	1968 Survey	Total
0 - 2	68	46	114
3	38	24	62
4	31	25	56
5 +	38	27	65
Total	175	122	297

A chi-square test for homogeneity applied to this data, on a hypothesis involved a critical level of chi-square of 6.25 at the 0.90 value with 3 degrees of freedom.

The calculated value of chi-square was 0.390 and the hypothesis of homogeneity was accepted.

We conclude therefore that the M.R.A. data of 1968 corresponds to the U.C.T. data of 1967.

* 33. Only areas 2, 12, 14, 15, 19, 22 and 23 had sample sizes in excess of 50. At this size a sample is likely to vary by 6.2 persons 95% of the time, and by 14.2 persons 50% of the time.

Source / ... ...

Source - MRA Survey, Claremont Shopping Centre. May 1969.

* 34. In calculating the land size, it was assumed that the mean land size of flats was 1/20 acre.

* 35. We have already commented on the diffuse nature of the Central Place from the point of view of family travel times (their force mobiles). The patterns of D 1 and D 2 do not appear to express a force mobile system either.

* 36. The statistic and method for these tests were derived from :-

William C. Guenther. Concepts of Statistical Inference (McGraw Hill. 1965 Copyright).

M.J. Moroney. Facts From Figures (Pelican A 236).

H.T. Hayslett. Statistics Made Simple (W.H. Allen. London 1967).

The samples are drawn randomly from a very large population without replacement. All the experiments were repeated a fixed number of times. Yates correction for continuity was used.

* 37. Areas 9, 10 and 21 all had high but unknown proportions of economic and sub-economic housing in them, which could not be regarded as Free-Market housing. An error in the family size data for zone 4 (as transcribed) rendered it unusable.

* 38. Levels of chi-square calculated equal to zero lead to the suspicion that the fit is "too good to be true". However, the approximate nature of the statistic used for the correction for continuity probably accounts for such low figures.

* 39. Areas 19, 21 and 23 were not used as these were judged to be outside the Metropolitan area. This also applies to Zone 22 but this was included

for interest sake and because it fitted. Zone 4 was again excluded because of the error in the Household Statistics.

* 40. As with the Household and land size statistics, this was given in the twenty three zones by various categories i.e. up to R19, R20 to R49, R50 - R79, R80 - R99, R100-R149, R150 - R199, R200 - R249, R250 - R299, R300 - R349, R350 - R399, R400 - R499, R500 +, all monthly.

* 41. The MRA income data was also supplied in four categories of income (A, B, C and D.) If these are subjected to a chi-square test for homogeneity, the result is most enlightening.

ZONES	INCOME CATEGORIES				
	A	B	C	D	TOTAL
1 - 3	29	16	46	13	104
4 - 6	10	18	51	22	101
7 - 10	20	22	48	22	112
11 - 12	20	15	50	16	101
13 - 14	12	16	57	13	98
15 - 16	11	13	55	14	93
17 - 18	8	7	30	8	53
TOTAL	110	107	337	108	662

The Critical level of chi square at 0.90 with eighteen degrees of freedom is 25.90. The calculated value is 20.665.
Therefore the distribution of incomes by the four groups can be taken as equal throughout the zones.

* 42.

MEAN INCOMES :-

AREAS	MEAN INCOME	AREAS	MEAN INCOME	AREAS	MEAN INCOME
1	R477	9	R228	17	R295
2	R332	10	R413	18	R304
3	R271	11	R233	19	R293
4	R211	12	R359	20	R306

AREAS	MEAN INCOME	AREAS	MEAN INCOME	AREAS	MEAN INCOME
5	R294	13	R226	21	R170
6	R143	14	R329	22	R256
7	R203	15	R315	23	R302
8	R383	16	R284		

* 43. Richard G. Lipsey. An Introduction to Positive Economics (Weidenfeld and Nicolson, London. 1963. 295 - 299).

J. Pen. Modern Economics (Pelican A 710, 166).

H. Speight. Economics. The Science of Prices and Incomes. (Methuen: London. 1965. 107-8. 193, 361 - 72, 378 - 83).

* 44. "Millions of single persons comprise a large group whose requirements are neglected by the market."

- Martin Meyerson, Barbara Terrett & William L.C. Wheaton. Housing, People, and Cities (McGraw - Hill 1962).

* 45. Grigsby states that "it is wearying hunting for homes, and expensive moving."

- Grigsby op. cit.

* 46. "The overwhelming preference for single family, detached houses expressed in consumer surveys refers to preferences of only a fraction of the market. The concentration of home building on single family houses largely ignores this fact. Indeed it has been estimated that the largest potential housing market of the future consists of 13 million "families" not consisting of husband-wife-child, who now live with others."

- Grigsby / ... ...

- Grigsby op. cit.

* 47. The idea of the family life cycle altering the "force mobiles" of families over time, and the consideration of families of various types choosing a location are discussed in -

- Michael A. Stegman. Accessibility Models and Residential Location (J.A.I.P. January 1969.)

*48. Grigsby op. cit.

* 49. Grigsby op. cit.

* 50. "In the market for shelter, unlike most markets, the article of commerce must be consumed at the point where it is produced. When a family no longer wants to use ..... a particular dwelling unit ..... it cannot have the unit disposed of as it would a car or refrigerator, and replaced on the same site by one which better suits its needs. The dwelling unit is immobile, so the family must move."

- Grigsby op. cit.

* 51. Constantinos A. Doxiadis Ekistics. An introduction to the science of human settlements. (Hutchinson 1968).

* 52. Aside from individual character variation, there is the family life cycle, through which most move. Lancing and Kish categorise it thus :- Family vs single, older vs younger head, and no children vs children. They demonstrate considerable variations in spending patterns and income for these different groupings.

- John B. Lansing and Leslie Kish. Family Life Cycle as an Independant Variable (American Sociological Review, 22; 512-19).

* 53. / ... ...

* 53. The following data was extracted from census tract information for the United States :-

	STATUS	CENTRE	IMMEDIATE SUBURBS	PERIPHERAL SUBURBS
MARRIED	High 1	56.8	70.9	-
	2	61.1	71.9	75.8
	3	63.3	69.0	70.8
	4	61.9	69.3	68.2
	Low 5	65.5	68.2	-
25 - 44 Years	High 1	50.8	49.1	-
	2	51.4	50.1	42.0
	3	50.0	48.8	47.1
	4	47.7	49.1	47.5
	Low 5	49.9	52.2	-

- Sidney Goldstein & Kurt B. Meyer Status Differences in A Metropolitan Population. (Urban Studies. May 1965).

* 54. It may be noted that families do not necessarily spend more on housing as they increase in size.

Meyerson, Terret and Wheaton (ob. cit.) quote the following date for American families earning four to five thousand dollars :-

2 person families spent 15.7% on housing
3 person families spent 15.3% on housing
4 person families spent 14.5% on housing
5 person families spent 13.9% on housing

* 55. / ... ...

*55.

HOUSEHOLD SIZE.

ZONES	0 - 2	3 - 4	5 +	TOTAL
1 - 3	37	53	14	104
4 - 6	44	33	24	101
7 - 10	19	59	34	112
11 - 12	32	47	22	101
13 - 14	22	47	29	98
15 - 16	44	33	16	93
17 - 18	15	23	15	53
TOTAL	213	295	154	662

Chi square test for homogeneity. Critical level at 0.995 with 12 degrees of freedom = 28.30

Calculated chi-square = 43.43

Reject hypothesis of homogeneity.

*56. See appendix *42.

*57. TOP 6 EARNING AREAS

FAMILY SIZE	1	8 + 10	12	2	14	TOTAL
0 - 2	11	7	23	16	18	75
3 - 4	12	29	30	29	34	134
5 +	5	18	12	8	18	61
TOTAL	28	54	65	53	70	270

Chi square critical (0.900) 8 degrees of freedom = 12.02

Calculated chi-square = 10.741

Accept hypothesis of homogeneity.

*58. / ... ...

* 58. H. Speight op. cit. 388.

* 59. In its most simple form, a subdivion application will involve the owner and his consultants, the Local Authority, the Surveyor General, The Townships Board and the Administrator. In its most complex form the Minister of Mines, the Bondholder, a Conveyancer, other local authorities, the Group Areas Board, the Provisional Secretary, the Government Printer, the Public and the Deeds Office will also be involved.

* 60. Occupied Dwellings Cape Town Metropolitan 1960 54,707 houses with 232,153 occupants.

Less than	three rooms	1,651	houses with 5,309 occupants.
	three rooms	9,309	houses with36,152 occupants.
	four rooms	19,742	houses with84,896 occupants.
	five rooms	13,810	houses with58,723 occupants.
	six rooms	5,883	houses with26,268 occupants.
more than	six rooms	4,312	houses with20,805 occupants.

- Department of Census and Statistics.

* 61. Grigsby op. cit. 22.

* 62. Provisional Town Planning Scheme.

* 63. S.S. Morris Provisional Town Planning Scheme. Preliminary Statement. Woodstock to Wynberg. (October 1950.)

* 64. Houses converted to double dwelling houses must be on a site which in 1940 was 1/4 acre (10,000 Cape Square Feet.)

- Provisional Town Planning Scheme. Municipality of Cape Town. 102 (1) (e) (i).

* 65. / ... ...

* 65. The Building Survey Department of the City Engineer's Department of the Cape Town City Council assembles statistics monthly of building plans passed by class of building. Unfortunately the relative bulk of these buildings is not recorded, and in order to discover what these were, it was necessary to refer to a ledger in which all plans passed were recorded consecutively, select the Plan numbers of the Flat Developments, make application on a prescribed form for these plans to be salvaged from the archives, wait some days until these had been found, then scrutinise them and having found the erf. number, look up their bulk in a ledger in which this was recorded (also consecutively), make application on the prescribed form to discover the zoning from the Town Planning Division and then apply to the Survey Division for the Site Area, so that allowable bulk might be computed.

In the circumstances, the effort did not justify the end result, and it was assumed that *65 was correct.

* 66. Terrace Houses are permitted only in General Residential Zonings, and then only with the Special Consent of the Council.

- Preliminary Town Planning Scheme. Municipality of Cape Town. 15 (i).

* 67. In the case of flats, Territorial Size was taken as the site area divided by the number of Dwelling Units.

* 68. Lipsey. op. cit. 518 - 20.

E.H. Phelps Brown and J. Wiseman A Course in Applied Economics (Pitman 1964. 213 - 232.)

Peter Penny Rent Control (The South African Law Journal).

Turvey. / ... .

Turvey. The Economics of Real Property (43-46).

* 69. ANNUAL FAMILY EXPENDITURE OF RENTS, HOUSE PAYMENTS ETC. SOUTH AFRICA 1966.

Income	less	than	R2,000	:-	R182	or 18.2%
		-	R2,999	:-	R345	or 13.8%
		-	R3,999	:-	R458	or 13.1%
		-	R4,999	:-	R554	or 12.3%
		-	R5,999	:-	R604	or 11%
		-	R7,999	:-	R812	or 11.6%
	more	than	R8,000	:-	R756	or 8.4%

PIENAAR AND ASSOCIATES STATS MAGAZINE.

* 70. - Department of Census and Statistics.

* 71. - Should African Statistics 1968. Bureau of Statistics (Govt. Printer). It should be noted that the Cape Town City Council estimate the growth at 21% from 1960 to 1967.

- Pienaar and Associates. Stats Magazine.

* 72. Penny op. cit. 498.

* 73. - Frederick C. Kent & Maude E. Kent. Compound Interest and Annuity Tables (McGraw Hill Paperback 1963).

*74. - Penny op. cit. 495.

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CAPE TOWN RESIDENTIAL PATTERNS

An Examination Of Natural Processes In Housing, And Of The Distortion Of These Natural Patterns, All With Special Reference To Cape Town.

FREDERICK EHLERS B.Arch. M.I.A.

SUMMARY OF PRINCIPAL FEATURES

Thesis for the Degree of
Master for Urban and Regional Planning
University of Cape Town.
October 1970.

PURPOSE OF THE STUDY.

To consider housing patterns in relation to a field theory, to measure housing patterns in Cape Town against hypothesis consistant with this theory, to identify unnatural distortions particularly with reference to Economic Theory, Law and Legislation.

THE FIELD THEORY.

A field theory of housing was constructed. This stated that an individual interacted symbiotically with his environment, that a number of individuals comprising a household would interact with each other and their home environment, that households would interact with each other in the struggle for ideal location, and that therefore the form of any home territory would, ceteris paribus, be determined by the point of equilibrium between the forces of interaction of its household with other households, and the forces of interaction between itself and its household.

The theory further stated that if the other forces were held constant, then the size of a home territory would vary dependantly as the numbers comprising its household varied.

MEASUREMENT OF HYPOTHESIS DERIVED FROM FIELD THEORY.

The hypothesis that Household Size and Home Territorial Size are dependant variables was tested by use of recent survey data for Cape Town.

The Metropolitan Area was divided into Seven Zones and it was found that in each zone the following correlation occurred:-

NUMBERS OF

Flats	= Households - 3 persons.
-½ Acre Houses	= Households 3 to 4 persons.
+½ Acre Houses	= Households 5+ persons.

Statistical tests showed that the probability of such a correlation being due to chance is extremely low.

INCOME AND SUBDIVISION SIZE.

It was found, by further statistical tests, that income level was not a significant determinant of home territorial size.

It was further observed that the seven zones were homogeneous with respect to the distribution of Incomes by categories A, B, C and D, and a statistical test

showed that the probability of this being due to chance was remote.

However, great variation of income structure occurred between the Areas comprising the zones.

These observations permitted of further development of the theory, translated into Economic Terms.

THE ECONOMICS OF HOUSING.

An examination of economic theory, especially with regard to the allocation of housing resources in a perfectly competitive market, suggests that a continuum of housing of varying types, offering as much substitutability as the extent of the market will permit, will represent the best use of resources. The ecological theory likewise argues for such a continuum.

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LACK OF SUBSTITUTABILITY IN CAPE TOWN.

Statistical Tests carried out on the data demonstrated that the proportion of households of various size was not at all homogenious from zone to zone.

However, further tests showed that the highest income areas within each zone had homogenious household size distributions, indicating that locational choice in this group was independant of the numbers of persons comprising the households.

It was not reasonable to presume that the other income groups were not similarly homogenious in their demand structure. It was therefore argued that the inequity of the general household size distribution was due to imbalances in the proportions of residential subdivisions of each size.

LACK OF FLEXIBILITY.

Regulations bearing upon land use in Cape Town showed that the actual or effective subdivisions of residential land, once determined, are relatively inflexible. The theory, by contrast, requires that great flexibility should be possible to permit of constant adaptation to changing family cycles, migration, etc.

GAPS IN THE CONTINUUM - FREEHOLD AND LEASEHOLD.

Inequities in the degree of development of the available stock of zonings for flat development in Cape Town was observed. It was argued that this was due to the fact that the zonings had placed a value on the land which could not be realised by all immediately, with the result that many such zonings were held for future development, while others were developed to the maximum to absorb the demand.

The zonings for flats prescribe a maximum floorspace, but not the number of units into which this may be subdivided. It was argued that Rent Control Legislation would

tend to inflate the rents of new (uncontrolled) premises, causing the demand side of the market to substitute into smaller units. The consequence of this would be that smaller units would be supplied and a gap would be opened between freehold and leasehold dwelling units. A model, using data, was constructed to demonstrate this effect.

THEREBY TO ISOLATE SOME UNNATURAL IMPERFECTIONS IN THE ENVIRONMENT AS A BASIS FOR PLANNING DECISION.

TO STUDY HOUSING IN CAPE TOWN ESPECIALLY IN RELATION TO AN ECOLOGICAL THEORY STATED BELOW.

DEFINITION OF ECOLOGY:- STUDY OF AN INDIVIDUAL IN RELATION TO ITS ENVIRONMENT

ACCEPTANCE OF CONTEMPORARY GENERAL THEORY OF EVOLUTION.

ACCEPTANCE OF EVOLUTIONARY NATURE OF ECOLOGY.

PRINCIPLES OF THE GENERAL THEORY OF EVOLUTION:-

*Variation and Gradation.
*Variety O
*Struggle to adapt to Niches.
*Struggle to adapt Niches,
*Natural selection through systematic elimination of ill-adapted traits.
*Survival of the fittest traits through superior exercise of:-
  Physical adaptations.
  Psychological Dominance.
  Symbiotic Alliances.

and consequent superior transmission of the superior traits (physiological or cultural or both)

Economic concept of competition

TENDENCY FOR "BLOODY IN TOOTH AND CLAW" TYPE OF ELIMINATION OF UNFAVOURABLE TRAITS TO BE OFFSET BY "PSYCHOLOGICAL DOMINANCE" TYPE.

ACCEPTANCE OF PRINCIPLE HELD BY ETHOLOGISTS & SOCIAL PSYCHIATRISTS, THAT ACCESS TO DESIRED RESOURSES DETERMINED PARTLY BY PSYCHOLOGICAL DOMINANCE. (Hierarchical).

EVOLUTION OF SOCIAL ORGANISATIONS. (variously competitive/cooperative)

Economic concept of Division of Labour

ACCEPTANCE OF IDEA OF EVOLVING NATURE OF ALLIANCES BOTH BETWEEN DISSIMILAR MEMBERS

REJECTION OF PHILOSOPHY OF SCHOOL OF "SUBJECTIVE IDEALISTS". (Everything exists in the mind; the senses merely mislead, are themselves part of the delusions of the mind.)

REJECTION OF OBJECTIONS TO THE GENERAL THEORY OF EVOLUTION BY ANTHROPOCENTRICISTS AND RELIGIOUS DOGMATISTS

ACCEPTANCE OF PHILOSOPHY OF SCHOOL OF "COMMONSENSE REALISTS" (There is a real world, and our senses tell us about it.)

REJECTION OF EXTENSIONS TO GENERAL THEORY OF EVOLUTION BY THE SO-CALLED "NOTHING BUT" SCHOOL. (Man is nothing but an animal)

Evidence of simultaneous evolution of Mans morphology and culture.

ACCEPTANCE OF PRINCIPLE THAT RESPONSE TRAITS ARE BIOCHEMICAL IN ORIGIN

OTHER SOCIAL ORGANISATIONS other than politico/economic

POORLY ADAPTED INDIVIDUALS DISPLAY SYMPTOMS OF HUNGER, ILLNESSES AND PSYCHOSES, AS WELL AS LOW FERTILITY

ACCEPTANCE OF PRINCIPLE THAT BEHAVIOURAL TRAITS ARE EVOLVED AND INHERITABLE , AND THAT THESE FIND EXPRESSION IN PHYSIOCHEMICAL TRAITS WHICH ARE ALSO INHERITABLE

ECONOMIC AND POLITICAL ORGANISATION

VALUE SYSTEMS

MORAL ATTITUDES TABOOS CULTURAL BIASES

PRESTIGE

ACCEPTANCE OF PRINCIPAL THAT INTERACTION OF INDIVIDUALS AND THEIR ENVIRONMENTS SHAPES BOTH THE INDIVIDUAL AND THE ENVIRONMENT. (At physical, social and psychological levels.)

PREFERENCES OF INDIVIDUALS

DESIREABILITY DUE TO PROXIMITY TO OTHER ACTIVITY

INFORMAL ENFORCEMENT OF GROUP VALUES (social pressures)

ACCEPTANCE OF PRINCIPLE THAT MAN'S PHYSIOCULTURAL MORPHOLOGY REPRESENTS AN ADAPTATION TO AN ENVIRONMENT.

FORMALISED ENFORCEMENT OF GROUP VALUES

Imperfections/misdirections to goal attainment

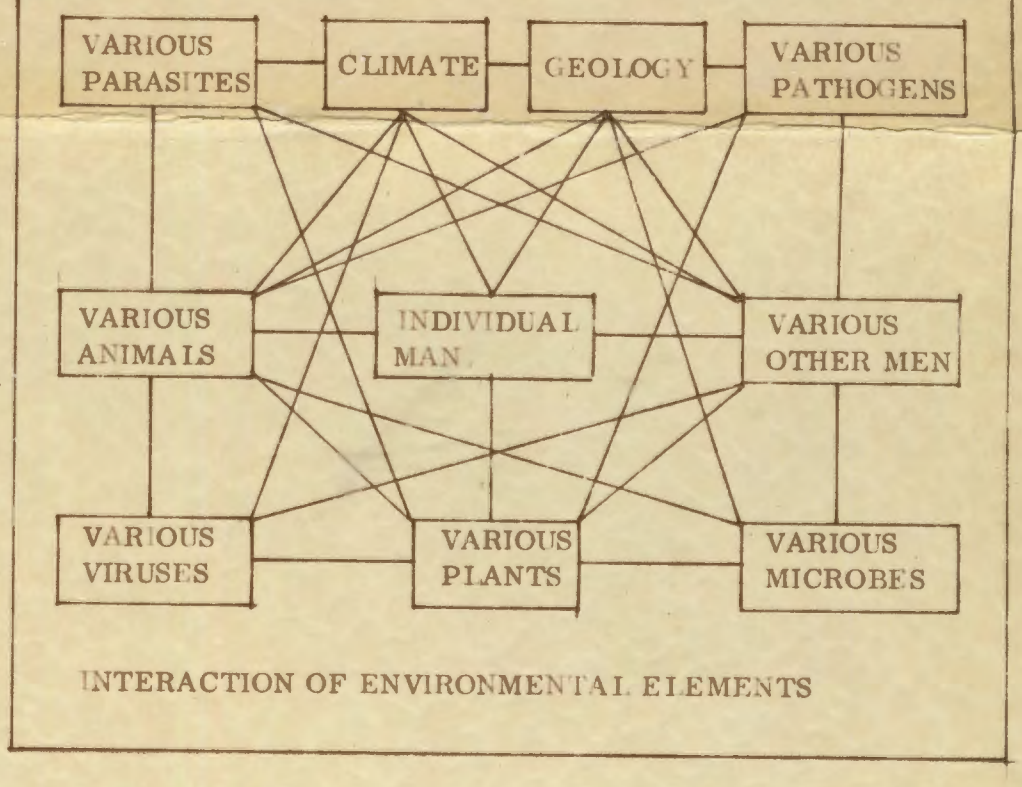
SOCIAL PRESSURES

GREAT COMPLEXITY OF MULTIPLE ENVIRONMENT

CONSTANT CHANGE DUE TO LIFE CYCLES, CHANGES IN BALANCE, CLIMATE AND OTHER CYCLES

POLLUTION (unfavourable environmental adaptation)

MOBILITY OF LIVE ORGANISMS



INTERACTION OF ENVIRONMENTAL ELEMENTS

STATE OF ENFORCEMENT AGENCIES

POLITICAL DOMINANCE PATTERNS

FEASABILITY OF ENFORCEMENT

ABILITY OF PEOPLE TO COMPLY

PHYSIOGRAPHIC NATURE OF ENVIRONMENT

VARIETY OF SUPPLY OF TERRITORIAL NICHES

CHOICE OF MOST SUITABLE NICHE

TERRITORIAL IMPERATIVE

AGGREGATION

CONFLICT BETWEEN COMPETITORS

INVASION & SUCCESSION

ALLOCATION OF TERRITORIAL NICHE TO MOST ABLE OR ONLY CLAIMANT

COMPETITION FOR CONTROL OF TERRITORY (individually or by group)

CENTRALIZATION DECENTRALIZATION

DEED RESTRICTIONS ZONING, NATIONAL HOUSING POLICIES, COMMON LAW ETC.

ALLOCATION OF RESOURCES THROUGH PERFECT COMPETITION OR MANAGED ECONOMY

GEOGRAPHICAL DISTRIBUTION OF HOUSING

DOMINANCE, GRADIENT & SEGREGATION

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